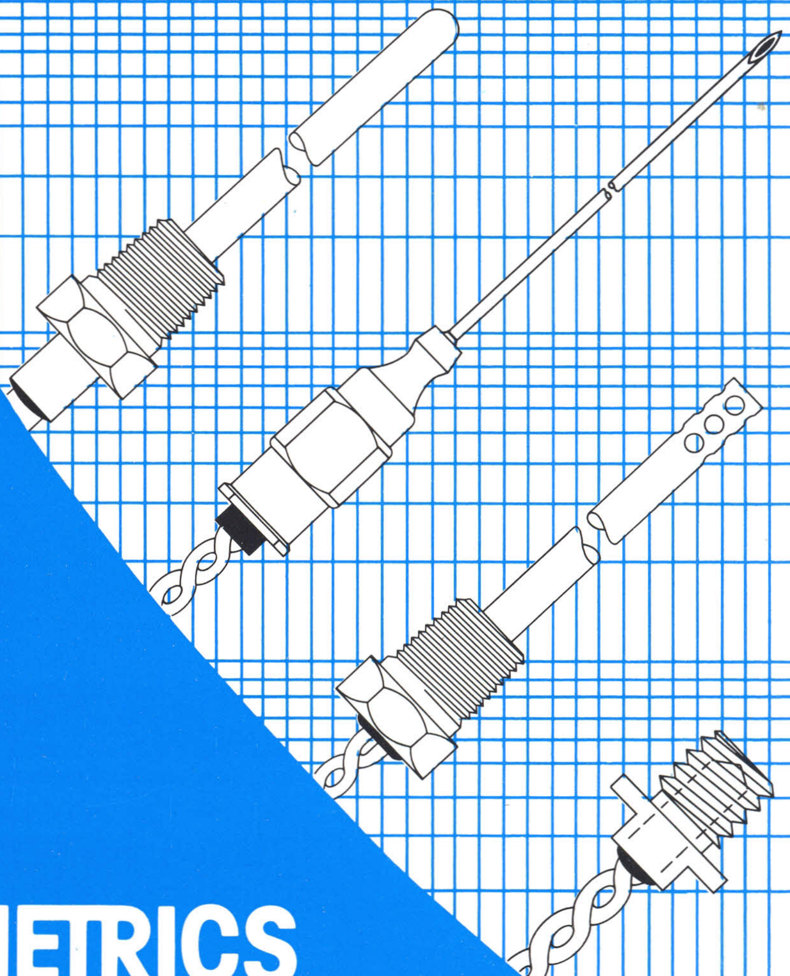
THERMISTOR SENSOR HANDBOOK



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Thermometrics... The Source of Thermistor Expertise

THERMOMETRICS has established a position in the electronics and general technical community as "THE SOURCE OF THERMISTOR EXPERTISE." Our reputation for the HIGHEST QUALITY products at low, competitive prices continues as an axiom of our business posture.

Our continuous R&D efforts have pioneered many noteworthy developments. Some are: The first precision Thermistor Standard, called the Series S-10; the Series SP-1 ultra-stable thermistors; a high temperature series for use above 450° C; the Fastip Thermoprobes which offer response times of 7 milliseconds; the Unitherm interchangeable thermistor line; the Series BR ruggedized beads for high reliability sensor assembly operations; special process Medical Catheter Thermistors; the A919a Fluid Temperature Sensors; and Precision Temperature Calibration to .0015° C.

The Thermometrics engineering staff routinely (and graciously) offers applications assistance. From a one time experiment to a large volume OEM requirement, you will find us interested and informed with imaginative thermistor expertise at your disposal. Your new ideas and requirements are welcome challenges for us at Thermometrics to continue to advance the thermistor State-of-the-Art further in the future.

This Thermistor Sensor Handbook is designed to offer our customers a comprehensive selection of the most commonly used protective housings and mounts. The full range of thermistor types listed in our Thermistor Catalog may be used in these assemblies. These thermistor types are briefly summarized in the Thermistor Selection Guide which is reproduced on Page 2 .

Please consult the Thermistor Catalog for more complete information on the electrical, thermal and mechanical properties of each thermistor type.

Every attempt has been made to organize this book to serve you rapidly and accurately. If you don't see the sensor which meets your specific requirements, we probably have the modification you need listed in our file of non-standard sensors. Please call us with any information requests, questions, or if you just want to discuss thermistors and their applications.

Thermometrics, Inc. manufactures qualified Thermistors and Sensor Assemblies to satisfy your requirements for any of the thermistor applications listed below. Please contact us for assistance in matching the proper thermistor to your application or to obtain information on new applications.

TABLE 1

I. THERMISTOR APPLICATIONS BASED ON R-vs-T CHARACTERISTICS

(Temperature Measurement & Control)

General Industrial Applications

Industrial Process Controls
Plastic Laminating Equipment
Hot Glue Dispensing Equipment
Auto & Truck Tire Curing
Fiber Processing & Manufacturing
Pyrometers (Non-Contact)
Photographic Processing
Copy Machines
Soldering Irons (Controlled)
Hot Mold Equipment (Thermoplastics)
Solar Energy Equipment

Consumer Appliances and Household Applications

Thermostats
Small Appliance Controls
Burglar Alarm Detectors
Oven Temperature Control
Refrigeration & Air Conditioning Equipment
Fire Detection

Medical Applications

Fever Thermometers
Dialysis Equipment
Rectal Temperature Monitoring
Myocardial Probes
Esophageal Tubes
Skin & Muscle Temperature
Thermodilution Catheters
Respiration Rate Measurement
Blood Analysis Equipment
Respirators
Hypodermic Needle Probes
Fluid Temperature

Instrumentation Applications (Compensation)

Motor Winding Temperature Compensation
Infrared Sensing Temperature Compensation
Instrument Winding Temperature Compensation

Automotive and Transportation Applications

Emission Controls
Differential Temperature Controls
Fire Protection and Safety Equipment
Engine Temperatures
Aircraft Temperatures
Rotor/Bearing Temperatures

Laboratory & Scientific Applications

Temperature Standards
Chemical Analysis
Oceanographic Research
Meteorology
Bathythermography
Calorimetry
Titration Studies
Geological Temperature Studies
Spectrophotometers
Bolometry
Osmometers

Food Handling Applications

Fast Food Processing
Perishable Shipping
Oven Temperature Control
Food Storage
Coffee Makers
Freezing Point Studies

High Reliability and Military Applications

Missiles & Spacecraft Temperatures
Aircraft Temperatures
Submarines & Underwater Monitoring
Fire Control Equipment

Communications Applications

Transistor Temperature Compensation
Gain Stabilization
Piezo Electric Temperature Compensation
Ambient Temperature Compensation

II. THERMISTOR APPLICATIONS BASED ON E-vs-I CHARACTERISTICS

General Industrial Applications

Liquid Level Control
Voltage Regulation
Anemometers
Power Indicators
Gas Chromatography Equipment
Microwave Power Measurement
Flow Sensing Equipment
Vacuum Manometers
Overload Protection
Gas Detection
Amplifier Gain or Level Stabilization

III. THERMISTOR APPLICATIONS BASED ON CURRENT-vs-TIME CHARACTERISTICS

Time Delay Devices
Sequential Switching
Surge Suppression

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TABLE OF CONTENTS

Technical Applications and Data .... Pages 3 to 27

Special Assembly Design Data .... Pages 28 to 33

Sensor Assemblies and Ordering Information .... Pages 32 to 33

Tubular Sensor Assemblies

Insulated Sleeve Assemblies With Extension Leads

T0100 .... Pages 34 to 35
T0200 .... Pages 36 to 37
T0300 .... Pages 38 to 39
T0400 .... Pages 40 to 41
T0500 .... Pages 42 to 45
T0600 .... Pages 46 to 47

Metal Tube Assemblies With Extension Leads

T1000 .... Pages 48 to 49
T1100 .... Pages 50 to 51
T1200 .... Pages 52 to 53
T1300 .... Pages 54 to 55
T1400 .... Pages 56 to 57
T1500 .... Pages 58 to 59
T1600 .... Pages 60 to 61
T1700 .... Pages 62 to 65

Metal Tubing Assemblies With Swaged Hub And Extension Leads

T2000 .... Pages 66 to 67
T2100 .... Pages 68 to 69
T2200 .... Pages 70 to 73
T2300 .... Pages 74 to 77

Metal Tubing Assemblies With Machined Hub And Extension Leads

T2500 .... Pages 78 to 79
T2600 .... Pages 80 to 81
T2700 .... Pages 82 to 85
T2800 .... Pages 86 to 89

Hypodermic Needle Assemblies

T3000 .... Pages 90 to 91
T3100 .... Pages 90 to 91

Metal Tubing Assemblies With Hex Head And Straight Thread Hubs

T5000 .... Pages 92 to 93
T5100 .... Pages 94 to 95
T5200 .... Pages 96 to 97
T5300 .... Pages 98 to 99
T5400 .... Pages 100 to 101
T5500 .... Pages 102 to 103

Metal Tubing Assemblies With Straight Thread On Hubs, Wrench Installed

T5600 .... Pages 104 to 105
T5700 .... Pages 106 to 107
T5800 .... Pages 108 to 109
T5900 .... Pages 110 to 111

Metal Tubing Assemblies With Tapered Thread Hubs

T7000 .... Pages 112 to 113
T7100 .... Pages 114 to 115
T7200 .... Pages 116 to 117
T7300 .... Pages 118 to 119
T7400 .... Pages 120 to 121
T7500 .... Pages 122 to 123

Metal Tubing Assemblies With Machined Hub And Armored Sheaths

T8000 .... Pages 124 to 125
T8100 .... Pages 126 to 127
T8150 .... Pages 128 to 129
T8200 .... Pages 130 to 131
T8300 .... Pages 132 to 133
T8350 .... Pages 134 to 135

Metal Tubing Assemblies With Tapered Thread Hub And Armored Sheaths

T8400 .... Pages 136 to 137
T8500 .... Pages 138 to 139
T8550 .... Pages 140 to 141
T8600 .... Pages 142 to 143
T8700 .... Pages 144 to 145
T8750 .... Pages 146 to 147

Surface Mount Sensor Assemblies

Adhesive Mounted Surface Sensors

M1000 .... Pages 148 to 149
M1100 .... Pages 150 to 151
M1200 .... Pages 152 to 153
M1300 .... Pages 154 to 155
M1400 .... Pages 156 to 157

Bolt Mounted Surface Sensors

M2000 .... Pages 158 to 159

Bolt Mounted Housings

M3000 .... Pages 160 to 161

Bolt Mounted Air Sensors

M3400 .... Pages 162 to 163

PC Board Surface Sensors

M4000 .... Pages 164 to 165
M4500 .... Pages 166 to 167

Header Assemblies For Thermistor Flakes

M5000 .... Pages 168 to 171

Header Assemblies For Thermistor Beads

M5500 .... Pages 172 to 175

Machine Screw Hex Head Housings

M6000 .... Pages 176 to 179

Straight Thread Body Wrench Installed Housings

M6500 .... Pages 180 to 181

Tapered Thread Housings

M7000 .... Pages 182 to 183

Special Application Sensor Assemblies

SERIES AB6 Thermobead & Thermoprobe Assemblies .... Pages 184 to 187
Fast Response Fluid Temperature Sensors .... Pages 188 to 189
Interchangeable Sub-Assemblies .... Pages 190 to 191
Series CSP Temperature Standards .... Pages 192 to 193
Series S, AS, ES Temperature Standards .... Pages 194 to 195

Technical Data

Resistance Ratio -vs- Temperature Tables .... Pages 196 to 197
General Information .... Page 200
Resistance Ratio Curves .... Back Inside Cover

THERMISTOR SELECTION GUIDE N.T.C. THERMISTORS (ALL THERMISTORS IN THIS CATALOG ARE NEGATIVE TEMPERATURE COEFFICIENT)

Page	Series	Thermistor Type	Dimensions	Available Lengths	Lead Diameter	Minimum Lead Length	Lead Material	Maximum Power Rating (Watts)	Maximum Continuous Temperature (°C)	Resistance Range @25°C (ohms)	Applications	Time Constant still air (seconds)	Time Constant water plunge (milliseconds)	Dissipation Constant still air (milliwatts per °C)	Dissipation Constant still water (milliwatts per °C)
THERMOBEADS			**Diameter**												
B-1	BB05	Bare Bead Thermistors	0.005″		0.0007″	5/16″	Pt Alloy	.004	150° C	1K to 10M	LOW COST. Ultrafast response times. Not as stable as glass coated units. Limited temperature range. Used in catheters, microwave power measurements, hypodermic needle assemblies, general temperature measurement and control.	0.11	4.5	.05	.25
B-1	BB07		0.007″		0.001″	5/16″	Pt Alloy	.006	150° C	300 to 10M		0.2	6	.07	.35
B-1	BB11		0.011″		0.002″	5/16″	Pt Alloy	.008	150° C	300 to 10M		0.65	11	.095	.47
B-2	B05	Small Glass Coated Thermistors	0.005″		0.0007″	5/16″	Pt Alloy	.006	300° C	1K to 10M	Ultrafast response time. Good stability. Used in microwave power measurements, catheters, hypodermic needle assemblies, general temperature measurement and control, gas analysis and flow sensing.	0.12	5	.045	.23
B-2	B07		0.007″		0.0007″	5/16″	Pt Alloy	.008	300° C	1K to 10M		0.23	7	.06	.30
B-4	B10		0.010″		0.001″	5/16″	Pt Alloy	.010	300° C	300 to 10M		0.5	10	.09	.45
B-4	B14		0.014″		0.001″	5/16″	Pt Alloy	.014	300° C	300 to 10M		1.0	15	.10	.50
B-6	B35	Large Glass Coated Thermistors	0.035″		0.004″	5/16″	Pt Alloy	.035	300° C	30Ω to 20M	Fast response. Good stability. Used for general temperature compensation, measurement and control.	4.5	100	.30	1.5
B-6	B43		0.043″		0.004″	5/16″	Pt Alloy	.035	300° C	30Ω to 20M		5.5	140	.35	2.0
B-8	BR11	Ruggedized Thermistors	0.011″		0.0007″	5/16″	Pt Alloy	.007	300° C	1K to 10M	More stable than glass coated counterparts. Highly reliable and easy to handle. Offer excellent stability. Recommended for use in all of the applications listed above; particularly suitable for assembly in a wide range of sensors and housings.	0.8	12	.065	.33
B-10	BR14		0.014″		0.001″	5/16″	Pt Alloy	.015	300° C	300 to 10M		1.0	14	.10	.50
B-10	BR16		0.016″		0.001″	5/16″	Pt Alloy	.015	300° C	300 to 10M		1.2	16	.12	.60
B-12	BR23		0.023″		0.002″	5/16″	Pt Alloy	.020	300° C	300 to 10M		1.7	40	.18	.90
B-14	BR32		0.032″		0.003″	5/16″	Pt Alloy	.035	300° C	100Ω to 10M		4.5	90	.28	1.4
B-16	BR42		0.042″		0.004″	5/16″	Pt Alloy	.042	300° C	30Ω to 20M		5.0	140	.33	1.65
B-18	BR55		0.055″		0.004″	5/16″	Pt Alloy	.050	300° C	30Ω to 20M		7.0	200	.50	2.5
THERMOPROBES & THERMORODS															
C-1	P20	Small Glass Probes	0.020″	1/16-¼″	0.001″	¼″	Pt Alloy	.020	300° C	300 to 10M	These fast response probes have improved stability over glass beads. The longer stem length makes them easy to handle. Suitable for use in small assemblies. They are also used for fluid flow measurement, liquid level sensing and control; and general temperature and control.	1.6	18	.14	.70
C-1	P25		0.025″	⅛-¼″	0.002″	¼″	Pt Alloy	.025	300° C	300 to 10M		2.0	23	.16	.80
C-3	P30		0.030″	⅛-¼″	0.003″	¼″	Pt Alloy	.035	300° C	100 to 10M		3.0	60	.30	1.5
C-5	P60	Large Glass Probes	0.060″	⅛-½″	0.008″	⅞″	Tinned Dumet	.060	300° C	30Ω to 20M	Low cost units offer high reliability, fast response, tinned leads. They are rugged, easy to handle and are the most stable thermistors. Used in larger assemblies and immersion probes.	12	300	.6	3.0
C-5	P65		0.065″	⅛-½″	0.008″	⅞″		.065	300° C	30Ω to 20M		13	320	.65	3.3
C-5	P85		0.085″	⅛-1″	0.012″	⅞″	Tinned Dumet	.075	300° C	30Ω to 20M		16	400	.8	4.0
C-5	P100		0.100″	⅛-2″	0.012″	⅞″		.100	300° C	30Ω to 20M		22	650	1.0	5.0
C-7	R60	Bead in Glass Rods with axial leads	0.060″	¼″ only	0.008″	⅞″	Tinned Dumet	.060	300° C	30Ω to 20M	These units have an axial lead configuration. They have the same applications as the probes listed above.	12	300	.6	3.0
C-7	R65		0.065″	¼″ only	0.008″	⅞″		.065	300° C	30Ω to 20M		13	320	.65	3.3
C-7	R85		0.085″	¼″ only	0.012″	⅞″	Tinned Dumet	.075	300° C	30Ω to 20M		16	400	.8	4.0
C-7	R100		0.100″	¼″ only	0.012″	⅞″		.100	300° C	30Ω to 20M		22	650	1.0	5.0
C-9	SP60	Ultrastable probes	0.060″	¼-½″	0.008″	⅞″	Tinned Dumet	.060	Depends upon Stability Class	30Ω to 20M	Specially aged and processed ultrastable probes for laboratory standards, calorimetry studies, precision measurement and control. Stability Class A (To 105° C) Tinned Dumet Leads Stability Class B (To 200° C) .008 Pt. Alloy Stability Class C (To 300° C) .008 Pt. Alloy	12	300	.6	3.0
C-9	SP65		0.065″	¼-½″	0.008″	⅞″		.065		30Ω to 20M		13	320	.65	3 3
C-9	SP85		0.085″	¼-½″	0.012″	⅞″		.075		30Ω to 20M		16	400	.8	4.0
C-9	SP100		0.100″	¼-½″	0.012″	⅞″		.100		30Ω to 20M		22	650	1.0	5.0

Page	Series	Thermistor Type	Dimensions		Lead Diameter	Minimum Lead Length	Lead Material	Maximum Power Rating (Watts)	Maximum Continuous Temperature (°C)	Resistance Range @ 25°C (ohms)	Applications	Time Constant still air (seconds)	Time Constant water plunge (milliseconds)	Dissipation Constant still air (milliwatts per °C)	Dissipation Constant still water (milliwatts per °C)
THERMOFLAKES			**Thickness**	**Size**											
D-1	1F	Flake thermistors (with leads)	0.001″ to 0.002″	.020″ x .020″ to .120″ x .120″	.0007″ to .001″	¼″	Pt Alloy	.030	105° C	50K-2M	Fast response, limited temperature range. Used in infrared detection, non-contact temperature sensing, intruder alarms, general purpose temperature measurement and control.	0.065	—	.30	—
D-1	2F					¼″	Pt Alloy	.035	105° C	50K-2M		0.075	—	.50	—
D-5	FM	Microcircuit Flake thermistors	see CATALOG for details				Pt Alloy	.050	105° C	1K-1M	For mounting in hybrid microcircuits, temperature control and compensation.	0.125	—	.50	—
HIGH TEMPERATURE THERMOBEADS & THERMOPROBES			**Maximum Diameter**	**Length**						**Resistance Range @ 125°C**					
E-1	HTBR55	Hi-Temp Beads	0.060″	—	0.004″	5/16″	Pt Alloy	.040	450° C	100K to 2M	The only thermistor available for continuous operation with good stability above 300°C. Used in high temperature measurement and control such as oven temperature monitoring and control, soldering station control. They have an improved range and better stability at high temperatures than conventional thermistors.	7	—	.50	—
E-3	HTP60	Hi-Temp Probe Thermistors	0.060″	¼-½″	0.008″	½″	Pt Alloy	.060	450° C	100K to 2M	Probes exhibit better stability and are used in larger assemblies.	12	—	.60	—
E-3	HTP65		0.065″	¼-½″	0.008″	½″	Pt Alloy	.065	450° C	100K to 2M		13	—	.65	—
E-3	HTP85		0.085″	¼-½″	0.008″	½″	Pt Alloy	.075	450° C	100K to 2M		16	—	.80	—
E-3	HTP100		0.100″	¼-½″	0.008″	½″	Pt Alloy	.100	450° C	100K to 2M		22	—	1.0	—
FASTIP THERMOPROBES										**Resistance Range @ 25°C**					
F-1	FP07	Fast Response Probe Thermistors	0.085″	½″	0.012″	⅞″	Tinned Dumet	.006	300° C	1K to 10M	Small bead thermistor sealed at the tip of a glass probe. They feature the ultra-fast response times of small beads in a more easily handled package. High speed temperature measurement and control, as well as bathythermography, flow measurement and control.	.10	7	.05	.25
F-1	FP10		0.085″	½″	0.012″	⅞″		.010	300° C	1K to 10M		.12	10	.09	.45
F-1	FP14		0.085″	½″	0.012″	⅞″		.014	300° C	1K to 10M		.15	16	.10	.50
CRYOGENIC THERMOPROBES										**Resistance Range @ – 196°C**					
G-1	CTP60	Cryogenic Probe Thermistors	0.060″	⅛-½″	0.008″	⅞″	Tinned Dumet	.060	125° C	100K to 1M	For very low temperature measurement and control. Cryogenic liquid level and flow measurement. Ruggedized, high stability. Calibration available. Use to – 196°C.	12	—	.60	—
G-1	CTP65		0.065″	⅛-½″	0.008″	⅞″		.065	125° C	100K to 1M		13	—	.65	—
G-1	CTP85		0.085″	⅛-½″	0.012″	⅞″		.075	125° C	100K to 1M		16	—	.80	—
G-1	CTP100		0.100″	⅛-½″	0.012″	⅞″		.100	125° C	100K to 1M		22	—	1.0	—
G-1	CTFP07	Cryogenic Fast Response Probe Thermistors	0.085″	½″	0.012″	⅞″		.006	125° C	100K to 1M	Ultrafast response times are the feature of these probes used in high speed cryogenic temperature measurements and control. Calibration available. Use to – 196°C.	.1	—	.05	—
G-1	CTFP10		0.085″	½″	0.012″	⅞″	Tinned Dumet	.010	125° C	100K to 1M		.12	—	.09	—
G-1	CTFP14		0.085″	½″	0.012″-	⅞″		.014	125° C	100K to 1M		.15	—	.10	—
THERMOCHIP			**Nominal Size**												
I-9	DC95F	Epoxy coated interchange-able chip	0.095″ DIA		0.012	1½″	Tinned Copper	.075	105° C		Close tolerance interchangeable chips. 2252, 3000, 5000, 10000 OHMS	10	1 SEC (STIRRED OIL)	1.0	8.0 . (STIRRED OIL)

INTRODUCTION:

The Thermistor Sensor Handbook is a comprehensive source of thermistor sensor design information. It is intended for use by design engineers, applications engineers, technicians and purchasing agents seeking to specify a sensor for measurement or control of the temperature related parameters of almost any substance or process.

The Sensor Handbook shows the most commonly used protective housings and mounts which are suitable for a wide variety of temperature measurement and control applications. The Sensor Handbook also provides valuable technical data on materials and configurations which will assist the customer in the design of a specialized sensor assembly.

Any of the thermistor types shown in the Thermistor Selection Guide may be used in the sensor assemblies, except that not all thermistor types and protective housings are compatible. The Thermistor Selection Guide may be found as a fold-out sheet in our general Thermistor Catalog, along with complete information on the electrical, thermal and mechanical properties of each thermistor type. Together, the Sensor Handbook and the Thermistor Catalog will provide the customer with the information needed to select or design a sensor assembly which is ideally suited to the specific application.

SENSOR HANDBOOK ORGANIZATION:

The Thermistor Sensor Handbook is divided into several main sections which are based upon the type of sensor assembly. Each section is then broken down into smaller groups, or series, of assemblies based upon the mounting method or major features.

The first main section deals with tubular type sensor assemblies. These sensors are most frequently used in applications where the thermistor is immersed into a fluid or substance, however, they may be used in other applications as required. All of these sensor assemblies have the letter "T" as the start of their assembly ordering codes.

The second main section deals with various mounting types of sensor assemblies which include surface temperature measurement, air temperature measurement and gas analysis application. All of these sensor assemblies have the letter "M" as the start of their assembly ordering codes.

The next main section involves special assembly types. These sensor assemblies have been designed for specific purposes, applications or markets. Some assemblies are given special ordering codes which are usually shortened since the options are limited. When customized assemblies are manufactured they would be assigned a letter "A" as the start of their assembly ordering code. Only a few of these assemblies are listed in this Sensor Handbook. Many other such non-standard assemblies are on file at Thermometrics. Thus, if you do not see any protective housing or mount which meets your specific requirements, please contact Thermometrics since we probably have the version you need listed in our file of non-standard sensors.

WHAT ARE THERMISTORS?

A thermistor is a ceramic semiconductor which exhibits a large change in resistance with a change in its body temperature. The word "thermistor" is actually a contraction of the words "thermal resistor." Although there are both positive coefficient (PTC) and negative coefficient (NTC) devices, the units which are shown in our standard Thermistor Catalog and which are discussed in this Sensor Handbook are all NTC types.

These NTC thermistors are composed of metal oxides such as the oxides of manganese, nickel, cobalt, copper, iron, and titanium. In Figure 1 the normalized resistance-temperature characteristics of several thermistor types are shown along with the normalized resistance-temperature characteristic of a commercial resistance temperature detector (RTD). A comparison of the curves will immediately show inherent advantages and disadvantages for both types of devices.

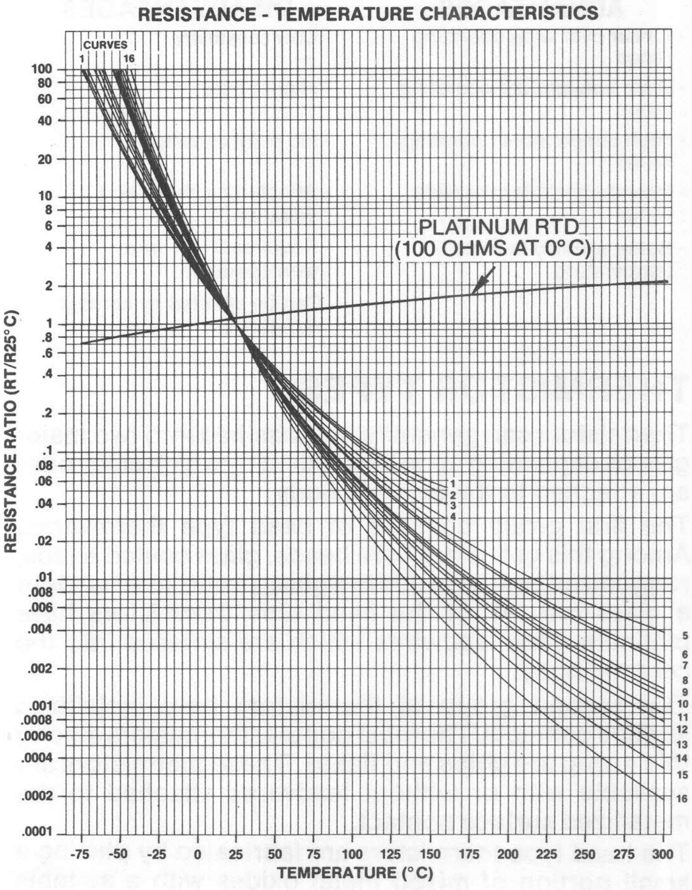

RESISTANCE - TEMPERATURE CHARACTERISTICS

FIGURE 1
RESISTANCE RATIO-TEMPERATURE CHARACTERISTICS OF THERMISTORS VERSUS RTD'S

The thermistors have much better sensitivity than RTD's and are therefore better suited for precision temperature measurements. The availability of high resistance values allows the thermistor to be used with long extension leads since the lead resistance or contact resistance effects can be greatly diminished. The non-linearity of the thermistor resistance-temperature characteristics puts a practical limit on the temperature span over which a thermistor can be operated in a measurement or control circuit. RTD's have lower sensitivity and are more linear and can therefore be used in applications where the temperature spans are very wide.

Thermistors have other important advantages over RTD's in that they are available in smaller sizes, with faster response times, at lower costs and with greater resistance to shock and vibration effects. Table 2 gives a quick comparison of thermistors and RTD's.

TABLE 2
COMPARISON OF THERMISTORS AND RTDS

THERMISTORS

ADVANTAGES	DISADVANTAGES
- Fast response	- Nonlinear
- Small size	- Narrow span for any single unit
- High resistances eliminate most lead resistance problems	- Interchangeability is limited unless matched pairs are used
- Rugged, not affected by shock or vibration	
- Lower cost	

RTD'S

ADVANTAGES	DISADVANTAGES
- Linear over wide operating range	- Low sensitivity
- Wide temperature operating range	- Higher cost
- High temperature operating range	- No point sensing
- Interchangeable over wide range	- Affected by shock and vibration
- Better stability at high temperature	- Requires 3 or 4 wire wire operation
	- Can be affected by contact resistance

THERMISTOR TYPES:

Thermistors can generally be classified into two major groups depending upon the method by which electrodes are attached to the ceramic body.

The first group consists of bead type thermistors. Among this group are bare beads, glass coated beads, ruggedized beads, beads in a glass probe, and beads in a glass rod. All of the bead type thermistors have platinum alloy leadwires which are sintered into the ceramic body.

The second group of thermistors have metallized surface contacts. The most popular thermistors among this group are chips and flakes. These thermistors are available with or without leadwires attached to the metallized surface contact.

The bead type thermistors are fabricated by placing a small portion of mixed metal oxides with a suitable binder onto a pair of parallel platinum alloy leadwires, which are under a slight amount of tension. After the mixture has been allowed to dry, or has been partially sintered, the strand of beads is removed from the fixture and sintered in a tubular furnace. The metal oxides shrink onto the platinum leadwires during this sintering and form intimate electrical bonds. The beads are then individually cut from the strand in one of the desired leadwire configurations. The beads may be left bare or they may be given an organic coating, however, for best stability the beads are hermetically sealed in glass. This can be a thin glass coating or a thicker, ruggedized glass coating. The bare bead can also be welded to larger diameter leadwires and sealed into a glass tube to form a rod or probe type thermistor.

The metallized surface contact type thermistors are fabricated by several different methods depending upon the basic geometry of the device. Chips are manufactured using a tape casting process while flakes are either bladed and cut into individual devices or they are screen printed. Once the desired geometry has been obtained the devices are sintered. The metallized surface contact is then applied by spraying, painting, screen printing or dipping as required and the contact is fired onto the ceramic body. Metallized surface contact type thermistors can be obtained with or without leads. The leads can be attached in various configurations depending upon the geometry of the device. Devices such as the chips can be ground to precision resistance tolerances at controlled temperatures after the leads are attached. A variety of organic coatings are available for the metallized surface contact types and recently, glass enclosed chips have been introduced.

ADVANTAGE/DISADVANTAGES OF THERMISTOR TYPES:

As a group, the hermetically sealed bead type thermistors are more stable than the metallized surface contact types. Of the bead types, those with a thin glass coating would be the least stable and the large glass probes would be the most stable. The hermetic glass seal strain relieves the leadwire-to-ceramic interface and prevents changes in the oxidation state of the thermistor thus providing improved stability. Among the metallized surface contact thermistors, flakes and uncoated chips are the least stable. Moderate to good stability may be obtained with epoxy coated chips although such devices exhibit significantly poorer stability than ruggedized hermetically sealed beads and probes. This is particularly true when the thermistors are exposed to strongly oxidizing or reducing environments. Chips which are hermetically sealed in glass, a recent innovation introduced by Thermometrics, exhibit stability characteristics which are comparable to hermetically sealed beads.

The bead type thermistors with leadwires sintered into the ceramic body permit operation at higher temperatures. Bead in glass probe thermistors are available with temperature ratings to 550° C and are very stable with continuous operating temperatures at or below 300° C. The metallized surface contact type thermistors are generally rated at 150° C with best stability observed when continuous operating temperatures are held to 105° C or less.

The bead type thermistors are generally smaller in size than the metallized surface contact type thermistors, have faster thermal time constant values and lower dissipation constant values. The small size and fast response of the beads is an advantage in many temperature measurement applications, however, the lower dissipation constant will result in greater self-heating effects in most applications.

The metallized surface contact type thermistors are somewhat easier to manufacture and therefore are lower in cost than the bead type thermistors. Chips have moderate response times and dissipation constants and they have the ability to be trimmed by cutting or grinding. Such precision trimmed devices, or interchangeable thermistors, are used in many applications where close tolerance curve tracking and reasonably low cost are important. Larger metallized surface contact type thermistors such as disks, wafers, washers and rods are available, but such units are generally used for crude, low cost applications. Such units typically are not used in high quality, reliable applications where precision measurements are required.

The bead type thermistors, being somewhat harder to manufacture and not easily adjusted, are usually matched in pairs for applications where interchangeable units are required. The cost for such bead pairs is relatively high when compared to the interchangeable chips; however, in applications where small size is important or where high temperatures will be encountered, the matched bead pairs offer the best solution.

Table 3 gives a summary of the advantages and disadvantages of the basic thermistor types.

TABLE 3 ADVANTAGES/DISADVANTAGES OF THERMISTOR TYPE:

I.) BEAD TYPE THERMISTORS:

Glass Coated Beads Beads in Glass Probe Bare Beads
Ruggedized Beads Beads in Glass Rod

	ADVANTAGES		DISADVANTAGES
A.)	Good to excellent stability, Leadwires, are strain relieved in glass hermetic seal.	A.)	Normally broad resistance tolerances, high cost for close tolerances.
B.)	High operating and storage temperatures.	B.)	Medium to low dissipation constants.
C.)	Smaller sizes available.	C.)	Matched pairs or resistive padding are required for interchangeability.
D.)	Fast response times.		

II.) METALLIZED SURFACE CONTACT TYPE THERMISTORS:

Chips Flakes

	ADVANTAGES		DISADVANTAGES
A.)	Normally tighter tolerances, lower cost for close tolerances.	A.)	Moderate to good stability. Difficult to obtain high stability without hermetic seal.
B.)	Low cost, single units for interchangeability.	B.)	Limited operating and storage temperatures.
C.)	Medium dissipation constants.	C.)	Medium sizes available.
		D.)	Medium response times.

PROPERTIES OF THERMISTORS:

Thermistors have thermal and electrical properties which are important considerations in each application. Once a type of thermistor device and a nominal resistance has been selected, the manufacturer will prepare a mixture of metal oxides in proper proportions to achieve the desired results. Such a mixture of metal oxides is referred to as the "material system" of the thermistor. The basic thermal and electrical properties are now fixed for the material system and thermistor structure selected.

Thermometrics supplies data on the thermal and electrical properties of each thermistor type in its Thermistor Catalog. Usually this data is presented as nominal resistance values, resistance-vs-temperature curves and tables, thermal time constant values and dissipation constant values.

Before dealing with specific applications, we shall discuss the basic thermal and electrical properties and what the product data represents.

THERMAL PROPERTIES:

When a thermistor is connected in an electrical circuit, power is dissipated as heat and the body temperature of the thermistor will rise above the ambient temperature of its environment. This can be expressed as:

$$T = T_A + \Delta T \qquad (1)$$

where T is the temperature of the thermistor; T_A is the ambient temperature; and ΔT is the rise in temperature due to the power dissipated in the thermistor. The rise in temperature, ΔT, is also known as the "self-heating" effect and is a major consideration in precision resistance thermometry applications.

When power is applied to a thermistor, or any physical device, the rate at which energy is supplied must equal the rate at which energy is lost plus the rate at which energy is absorbed (the energy storage capacity of the device).

$$\frac{dH}{dt} = \frac{dH_L}{dt} + \frac{dH_A}{dt} \qquad (2)$$

The rate at which thermal energy is supplied to the thermistor in an electrical circuit is equal to the power dissipated in the thermistor.

$$\frac{dH}{dt} = P = I^2R = EI \qquad (3)$$

The rate at which thermal energy is lost from the thermistor to its surroundings is proportional to the temperature rise of the thermistor.

$$\frac{dH_L}{dt} = \delta \Delta T = \delta \; (T - T_A) \qquad (4)$$

The dissipation constant, δ, is defined as the ratio, at a specified ambient temperature, of a change in the power dissipation in the thermistor to the resultant body temperature change. The dissipation constant depends upon the thermal conductivity and relative motion of the medium in which the thermistor is located, as well as the heat transfer from the thermistor to its surroundings by conduction through the leads, by free convection in the medium and by radiation. The dissipation constant is not a true constant since it varies slightly with the temperature and also with temperature rise.

The rate at which thermal energy is absorbed by the thermistor to produce a specific amount of rise in temperature can be expressed as follows:

$$\frac{dH_A}{dt} = sm\frac{dT}{dt} = \frac{C\,dT}{dt} \qquad (5)$$

where 's' is the specific heat and 'm' is the mass of the thermistor. The product of the specific heat and mass of the thermistor is the heat capacity, C, of the thermistor, and is dependent upon thermistor construction.

By substitution, we can arrive at the heat transfer equation for a thermistor at any instant in time after power has been applied to the circuit.

$$\frac{dH}{dt} = P = EI = \delta\,(T-T_A) + C\,\frac{dT}{dt} \qquad (6)$$

In order to complete our analysis of the thermal characteristics of thermistors, we must examine the thermistor behavior under transient and steady state conditions. The solution of equation (6) where P = constant is:

$$\Delta T = (T - T_A) = \frac{P}{\delta}\left[\,1 - \exp\{(-\delta/C)t\}\right] \qquad (7)$$

Equation (7) demonstrates that when a significant amount of power is dissipated in a thermistor, its body temperature will rise above the ambient temperature as a function of time. Transient conditions at "turn on", such as the Current-Time Characteristic, are governed by equation (7).

A condition of equilibrium is achieved when $dT/dt=0$ in equation (6) or when $t >> C/\delta$ in equation (7). In this steady state condition, the rate of heat loss is equal to the power supplied to the thermistor. Therefore:

$$\delta(T - T_A) = \delta \Delta T = P = E_T I_T \qquad (8)$$

where E_T is the steady state or static thermistor voltage and I_T is the steady state current. The Voltage-Current Characteristic is governed by this equation.

When the power is reduced in a thermistor to an amount where the self-heating is considered negligible, the heat transfer equation can be re-written as follows:

$$\frac{dT}{dt} = -\frac{\delta}{C}(T - T_A) \qquad (9)$$

Equation (9) is actually a mathematical statement of Newton's Law of Cooling and has the following solution:

$$T = T_A + (T_I - T_A)\exp\{-t/\tau\} \qquad (10)$$

where:

T_I is the initial body temperature

T_A is the ambient temperature

τ is the thermal time constant of the device, and $\tau = C/\delta$

The thermal time constant, τ, is the amount of time required for the thermistor to reach 63.2% of the temperature difference when subjected to a step function change in temperature under negligible power dissipation conditions. The thermal time constant is dependent upon the same environmental factors as the dissipation constant, namely, the thermal conductivity and motion of the medium, the conduction through the leads, the free convection in the medium and the radiation losses. For a given thermistor device, the factors which would tend to increase the dissipation constant also tend to reduce the thermal time constant and vice versa.

The discussions of the thermal properties of thermistors are based upon simple device structures. The thermal time constant and dissipation constant data which is given in thermistor product literature must indicate the test methods and mounting methods employed if it is to be valuable to the designer. Normally, data is not given for chips or flakes without leads, since these devices are totally dependent upon the method of mounting. Devices with leads are normally suspended by their leads in a still medium for testing purposes.

When any thermistor device is encapsulated into a sensor housing, the simple exponential response functions no longer exist. The mass of the housing and the thermal-conductivity of the materials used in the sensor will normally increase the dissipation constant of the thermistor and will invariably increase the thermal response time. The thermal properties are somewhat difficult to predict and testing of the finished sensor is usually required to obtain data on the response time and dissipation constant.

Proper consideration must be given to the design of a thermistor sensor assembly so that the thermal properties of the finished assembly are consistent with the desired application. For example, when a large diameter closed housing is used in a liquid environment, the dissipation constant may actually be reduced unless good thermal coupling is provided between the thermistor and housing shell. Similarly, the use of a small bead in a closed housing will not provide faster response than a glass probe unless care is exercised to couple the bead to the housing surface.

ELECTRICAL PROPERTIES:

There are three basic electrical characteristics of thermistors which account for virtually all of the applications in which thermistors may be used. These are:

a.) Current-Time Characteristic
b.) Voltage-Current Characteristic
c.) Resistance-Temperature Characteristic

There are also several applications where the thermistor is indirectly heated by some form of resistive element. These applications are merely special cases of one of the three basic electrical characteristics.

CURRENT-TIME CHARACTERISTICS:

In our analysis of the thermal properties of thermistors, we observed that a self-heated thermistor exhibits a body temperature rise that is a function of time. This is mathematically expressed in equation (6).

A transient condition exists in a thermistor circuit from the time at which power is first applied from a Thevenin source (t = 0), until the time at which an equilibrium condition is achieved. ($t >> \tau$). During this time the current will rise from an initial value to a final value and this current change as a function of time is called the "Current-Time Characteristic".

The Current-Time Characteristic is not a simple exponential relationship. The rate of current change will be initially low due to the high resistance of the thermistor and the added source resistance. As the device begins to self-heat the resistance will decrease rapidly and the rate of current change will increase. Finally, as the device approaches an equilibrium condition, the rate of current change will decrease as the current reaches its final value.

The factors which affect the Current-Time Characteristic are the heat capacity of the device (C), and the dissipation constant of the device (δ), the source voltage, the source resistance and the resistance of the device at a specified ambient temperature. The initial and final current values and the time required to reach the final current value can be altered as needed by proper circuit design.

The Current-Time Characteristic is used in time delay, surge suppression, filament protection, overload protection and sequential switching applications.

VOLTAGE-CURRENT CHARACTERISTICS:

Once a self-heated thermistor has reached a condition of equilibrium, the rate of heat loss from the device will be equal to the power supplied. This was discussed in the analysis of the thermal properties and is mathematically expressed by equation (8).

$$P = \delta (T-T_A) = E_T I_T$$

In our discussion of the dissipation constant, δ, we observed that it was slightly influenced by temperature and temperature difference, and that it was influenced to a greater degree by the thermal conductivity and relative motion of the medium, heat conduction through the leads, free convection and radiation.

If the dissipation constant variations are negligible for a specified medium and set of conditions, and the resistance-temperature characteristic is known, then equation (8) can be solved for the static voltage-current characteristic. Usually this characteristic is plotted on log-log coordinates in thermistor literature, where lines of constant resistance have a slope of +1 and lines of constant power have a slope of -1. Figure 2 shows the static voltage-current characteristic for a typical thermistor plotted on log-log coordinates.

For some applications it is more convenient to plot the static voltage-current characteristic on linear coordinates such as shown in Figure 3.

At very low currents the amount of power dissipated in the thermistor is negligible. The voltage-current characteristic will be tangential to a line of constant resistance that is equal to the zero-power resistance of the device at the specified ambient temperature. In this portion of the curve an increasing current produces an increase in the voltage drop across the thermistor according to Ohm's law.

FIGURE 2

VOLTAGE-CURRENT CHARACTERISTIC (LOG-LOG) BR14PA103N IN STILL AIR AT 25°C

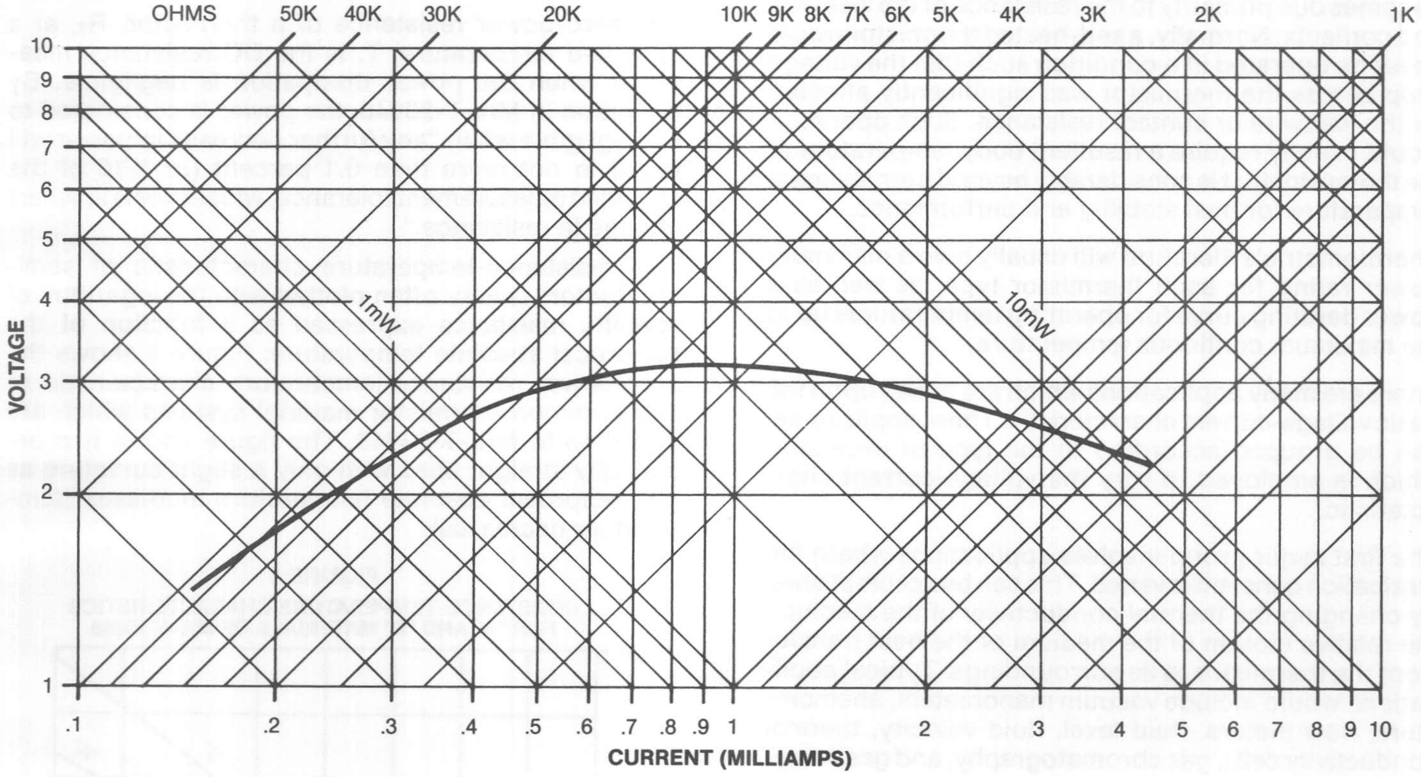
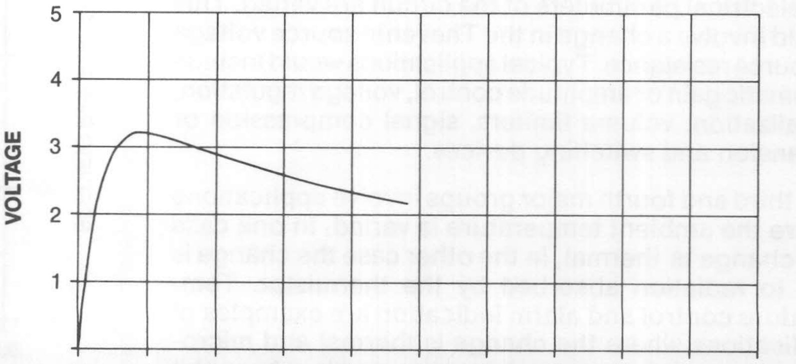


FIGURE 3

VOLTAGE-CURRENT CHARACTERISTIC (LINEAR)
BR14 PA103N IN STILL AIR AT 25°C



As the current is increased, the amount of self-heating increases resulting in a decrease in the resistance of the thermistor. Since the resistance of the thermistor is no longer constant, the voltage-current characteristic will begin to depart from the straight line condition. The slope of the voltage-current characteristic ($\Delta E/\Delta I$) will decrease as the current increases and the resistance of the device decreases still further. When the slope of the voltage-current curve decreases to zero, the voltage will reach a maximum of E_P, at a current value, I_P.

As the current is increased above the value of I_P, the slope of the characteristic continues to decrease and the thermistor exhibits the behavior of a negative resistance. At very large values of current, where the resistance of the thermistor becomes quite small, the effects of leadwires and contact resistance will start to be observed. The slope of the voltage-current characteristic will begin to increase slightly until it goes through zero again and the voltage reaches a minimum value. Afterward, the voltage-current characteristic increases as the voltage drop across the thermistor becomes due primarily to the resistance of the leadwire and contacts. Normally, a self-heated thermistor would never be operated in a condition such that the voltage drop across the thermistor was significantly affected by the leadwire or contact resistance. Such operation would usually require a resultant body temperature of the thermistor that is considerably beyond the maximum temperature for best stability and performance.

Thermometric's literature will usually give a maximum power rating for each thermistor type, as well as a power derating curve for operating temperatures up to the maximum continous temperature.

There are many applications which are based upon the static voltage-current characteristic. These applications can be grouped according to the type of excitation which is employed to vary the voltage-current characteristic.

The first major group involves applications where the dissipation constant is varied. This can be accomplished by changing the thermal conductivity of the medium, the relative motion of the medium or the heat transfer from the thermistor to its surroundings. Typical applications would include vacuum manometers, anemometers, flow meters, fluid level, fluid velocity, thermal conductivity cells, gas chromatography, and gas analysis.

The second major group involves applications where the electrical parameters of the circuit are varied. This would involve a change in the Thevenin source voltage or source resistance. Typical applications would include automatic gain or amplitude control, voltage regulation, equalization, volume limiters, signal compression or expansion and switching devices.

The third and fourth major groups involve applications where the ambient temperature is varied. In one case the change is thermal, in the other case the change is due to radiation absorbed by the thermistor. Temperature control and alarm indication are examples of applications where the change is thermal and microwave power measurement is an example where the change is due to absorbed radiation.

RESISTANCE-TEMPERATURE CHARACTERISTICS:

The definition of a thermistor, according to MIL-T-23648, states that the device, "is a thermally sensitive resistor whose primary function is to exhibit a change in electrical resistance with a change in body temperature."

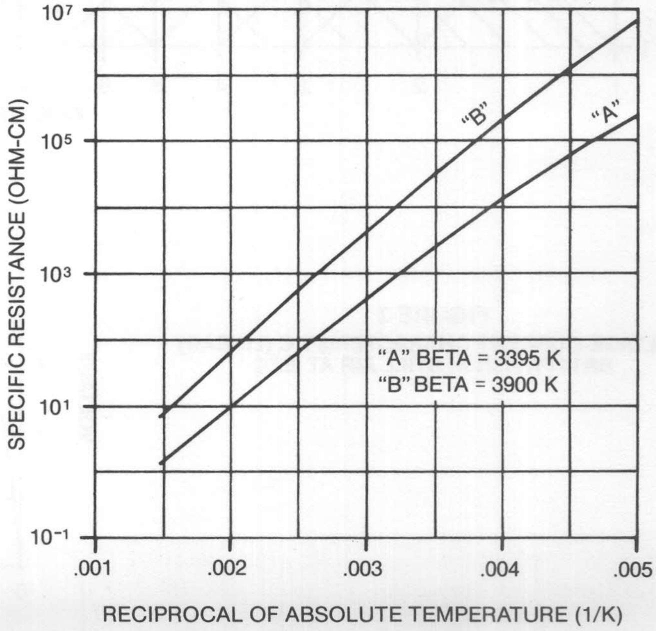
There are many applications based upon the resistance-temperature characteristic and they can be grouped into the general catagories of resistance thermometry, temperature control or temperature compensation. In the previous discussions of the current-time and voltage-current characteristics, we examined devices that were operated in a self-heated mode. As such, those devices were heated above the ambient temperature by the power being dissipated in the thermistor. For most applications in resistance thermometry or temperature control, the self-heating effect is undesirable. The zero-power resistance-temperature characteristic must be determined for thermistors that are used in measurement, control or compensation applications.

The zero-power resistance of a thermistor, R_T, at a specified temperature, T, is the DC resistance measured when the power dissipation is negligible. By definition in MIL-T-23648, the power is considered to be negligible when "any further decrease in power will result in not more than 0.1 percent (or 1/10 of the specified measurement tolerance, whichever is smaller) change in resistance."

The resistance-temperature characteristic of semiconductors is very often plotted with the logarithm of specific resistance expressed as a function of the reciprocal absolute temperature. Figure 4 shows the zero-power resistance-temperature characteristic of two common thermistor material systems which are specified in MIL-T-23648. The figure shows two essentially straight lines with only a slight curvature as the reciprocal absolute temperature increases (temperature decreases).

FIGURE 4

RESISTANCE-TEMPERATURE CHARACTERISTICS FOR "A" AND "B" MATERIALS OF MIL-T-23648



The conduction associated with a pure semiconductor is called "intrinsic conduction" and depends upon the thermal excitation of carriers across a single energy gap. The conduction which results when donor or acceptor impurities are chemically added to the semiconductor crystal lattice is called "extrinsic conduction." The energy gaps associated with extrinsic conduction are much smaller than the gaps associated with intrinsic conduction. As such, the impurity carriers will be available in greater numbers than the intrinsic carriers at low temperatures where thermal excitation is low. At higher temperatures the intrinsic carriers will become available in greater numbers while the impurity carriers will approach the maximum number determined by doping level.

A linear relationship exists for the logarithm of specific resistance versus reciprocal absolute temperature for an intrinsic semiconductor. With extrinsic semiconductors, the relationship is non-linear with greater departure from linearity occurring at lower temperatures.

The characteristics for the metal oxide thermistor materials of Figure 4 shows them to be basically extrinsic semiconductors, however, the departure from linearity is only slight. The "impurities" of metal oxide thermistors are physical rather than chemical and occur from either an excess or a deficiency of oxygen atoms in the crystal lattice.

INTRINSIC CONDUCTION:

Much of the early published literature on the resistance-temperature characteristic of thermistors is based upon the equations for intrinsic conduction.

The linear relationship between the logarithm of resistance and the reciprocal of absolute temperature is expressed as follows:

$$\ln R_T = A + \beta / T \qquad (11)$$

where: T is the absolute temperature. (Kelvin)
β beta, is the material constant. (Kelvin)

According to conductivity physics, a relationship exists between the energy gap of the forbidden band and the value of beta in an intrinsic semiconductor. For an oxide semiconductor, however, the crystal lattice does not exhibit simple band structure and so the relationship between beta and the energy gap is not straightforward.

If the material constant, β, is considered to be the slope of the $\ln R_T$ versus 1/T characteristic, then equation (11) will be valid for intrinsic conduction as well as extrinsic conduction, provided that the temperature span is small enough for the slope to be assumed linear over the span.

The resistance of a thermistor at a standard reference temperature may be expressed as:

$$\ln R_{TO} = A + \beta / T_O \qquad (12)$$

The simplest resistance-temperature characteristic equation, which has been frequently used in thermistor literature, is derived by subtracting equation (12) from equation (11) and solving for resistance.

$$\ln R_T - \ln R_{TO} = \ln (R_T/R_{TO}) = \beta (1/T - 1/T_O) \qquad (13)$$

therefore;

$$R_T = R_{TO} \exp \{ \beta (1/T - 1/T_O) \} \qquad (14)$$

If two points, or a single point and the slope, of the resistance-temperature characteristic are given, then equation (14) can be solved for any unknown quantity. Thus:

$$\beta = [T T_O / (T_O - T)] \ln (R_T / R_{TO}) \qquad (15)$$

and;

$$T = [(1/\beta) \ln (R_T / R_{TO}) + 1/T_O]^{-1} \qquad (16)$$

The temperature coefficient of resistance, (Alpha), has been previously defined:

$$\alpha = (1/R_T) \, dR_T/dT \qquad (17)$$

For the condition that beta is a constant, the alpha may be expressed as follows:

$$\alpha \cong -\beta / T^2 \qquad (18)$$

All of the above equations are based upon the intrinsic conduction, or straight line, relationship of $\ln R_T$ versus 1/T. They are useful in most applications where the temperature range is small and the beta may assumed to be constant. As figure 4 shows, the characteristic curves have a slight curvature. As the temperature is decreased, the slope of the curve also decreases (beta decreases) as predicted by conductivity physics for an extrinsic semiconductor. The interpolation errors (between 0° C and 50° C) introduced by assuming that beta is constant are approximately 0.01° C for 10° C spans, 0.04° C for 20° C spans, 0.1° C for 30° C spans, and .3° C for a 50° C span.

EXTRINSIC CONDUCTION:

Early investigations of thermistors attempted to provide improved fit of resistance-temperature data by taking into account the slight dependence of beta on temperature. Some of the resulting empirical equations are as follows:

$$R_T = A T^{-c} \exp \{ D/T \} \qquad (19A)$$

$$\ln R_T = a + b/(T + \theta) \qquad (19B)$$

$$\ln R_T = a + [b/(T + \theta)] + cT \qquad (19C)$$

While these equations offer a more accurate representation of the resistance-temperature characteristic, their solutions are more difficult and they are not widely used in thermistor applications.

The more recent literature on thermistors uses the standard curve fitting technique of considering $\ln R_T$ to be a polynomial in 1/T or vice versa.

$$\ln R_T = A_0 + A_1/T + A_2/T^2 + \ldots + A_N/T^N \qquad (20)$$

$$1/T = a_0 + a_1(\ln R_T) + a_2(\ln R_T)^2 + \ldots + a_N(\ln R_T)^N \qquad (21)$$

These equations provide a very accurate representation of the non-linear resistance-temperature characteristics typical of commercial thermistors. The equations are valid over wide temperature ranges. The degree of the polynomial required depends upon the temperature range and the non-linearity of the thermistor material system.

Thermometrics, Inc. has conducted investigations of the exactness of fit of resistance-temperature data of thermistors with third degree polynomials. Seventeen different thermistor material systems were evaluated over the temperature range of -80°C to +260°C (193.15K to 533.15K). The different material systems represent a range of resistivities that are available for commercial thermistors and the temperature range represents the normal span where thermistors would be most likely applied for temperature measurement or control. The results of the investigations indicate excellent curve fit using third-degree polynomials.

$$\ln R_T = A_0 + A_1/T + A_2/T^2 + A_3/T^3 \quad (22)$$

$$1/T = a_0 + a_1 (\ln R_T) + a_2 (\ln R_T)^2 + a_3 (\ln R_T)^3 \quad (23)$$

Equation (23) was originally investigated by Steinhart and Hart (Steinhart, J.S. and S.R. Hart, Calibration Curves for Thermistors, Deep-Sea Research 15, 497, 1968) for the oceanographic range of -2 to +30°C. They also observed that eliminating the squared term in this range created no significant loss in accuracy. They proposed the use of the following:

$$1/T = b_0 + b_1 (\ln R_T) + b_3 (\ln R_T)^3 \quad (24)$$

The work of Steinhart and Hart was confirmed by B.W. Mangum (at NBS) and R. Koehler (at Woods Hole Oceanographic Institute). They studied temperature ranges other than the oceanographic range and concluded that better accuracy is obtained when the squared term is retained. This is especially true at lower temperatures where extrinsic conduction is greater.

Thermometrics, Inc. also has conducted investigations to determine the loss of accuracy introduced by eliminating the squared term from equation (22). The resulting three constant, third-degree polynomial is:

$$\ln R_T = B_0 + B_1/T + B_3/T^3 \quad (25)$$

The error introduced by equation (25) depends upon the non-linearity of the resistance-temperature characteristic for the thermistor material system chosen and also upon the temperature range of interest.

The investigations conducted at Thermometrics, Inc., for the purpose of determining interpolation errors when using the equations for extrinsic conduction may be summarized as follows:

a.) Equations (22) and (23) do not introduce interpolation errors which exceed the total measurement uncertainties for:

a.1) 100° C spans within the range -80° C to +260° C.
a.2) 150° C spans within the range -60° C to +260° C.
a.3) 150° C to 200° C spans within the range 0° C to +260° C, except that interpolation error begins to approximate the measurement uncertainties.

b.) Equations (24) and (25) introduce interpolation errors which do not exceed the following conditions:

b.1) .001° C to .003° C error for 50° C spans and $T > 0°C$
b.2) .010° C to .020° C error for 50° C spans and $-80°C < T < 0°C$
b.3) .010° C error for 100° C span and $T > 0°C$
b.4) .020° C to .030° C error for 100° C span and $-80°C < T < 25°C$
b.5) .015° C error for 150° C span ($50°C \leq T \leq 200°C$)
b.6) .045° C error for 150° C span ($0°C \leq T \leq 150°C$)
b.7) .100° C error for 150° C span ($-60°C \leq T \leq 90°C$)
b.8) .080° C error for 200° C span ($0°C \leq T \leq 200°C$)

Equations (24) and (25) have three constants which are obtained by the simultaneous solution of three equations. Thus, three calibration points on the resistance-temperature characteristic must be given. Equations (22) and (23) have four constants, consequently, simultaneous solution of four equations and a minimum of four calibration points are required. The constants for equations (22) and (23) may also be obtained from a polynomial regression analysis when more than four calibrations points are given. Such an analysis statistically improves the accuracy of the data.

The material constant, β, was previously defined as the slope of the $\ln R_T$ versus 1/T characteristics.

thus: $$\beta = d \ln R_T / d(1/T) \quad (26)$$

from equation (25): $$\beta = B_1 + 3B_3/T^2 \quad (27)$$

from equation (22): $$\beta = A_1 + 2A_2/T + 3A_3/T^2 \quad (28)$$

The temperature coefficient of resistance, α, was defined by equation (17) and was approximated by equation (18) under the condition that beta was a constant.

from equation (25): $$\alpha = -(B_1/T^2 + 3B_3/T^4) \quad (29)$$

from equation (22): $$\alpha = -(A_1/T^2 + 2A_2/T^3 + 3A_3/T^4) \quad (30)$$

Note that when beta is considered to be a function of temperature, as shown in equations (27) and (28), then equation (18) becomes valid.

NOMINAL R-vs-T CURVES:

In the Thermometrics Thermistor Catalog the nominal resistance values at 25° C are given for each thermistor type on the specific product data sheet. Reference is also made to the applicable ratio-temperature table / curve for each nominal resistance value listed. The ratio-temperature tables and curves are given in Section "K" of the Thermistor catalog. They are also reprinted in this Sensor Handbook for convenience (see Pages 196 and 197).

RESISTANCE TOLERANCES:

The standard tolerances available for each thermistor type are given on the specific product data sheet. The typical distribution of resistance for a bead type thermistor with basic lead wires smaller than .003" diameter is ±25% of the nominal value at the reference temperature. Bead type thermistors with a basic lead wire diameter of .003" or greater have a typical resistance distribution of ±20%. Metallized surface contact type thermistors have typical resistance distributions of ±10%, except for flake type thermistors where the distribution may be ±20% or greater.

Tighter resistance tolerances are available for all types of thermistors, however, the lower expected yield from the production lots will translate to higher cost. In this regard, the metallized surface contact type thermistors have an advantage since their shapes can be easily adjusted or trimmed to provide closer resistance tolerances at lower costs.

BETA TOLERANCES:

The beta of a thermistor is determined by the composition and structure of the various metal oxides being used in the device. The beta can also be influenced by some manufacturing process variables. The result will be a variation from unit to unit within a production lot as well as from lot to lot.

The beta value supplied in Thermometrics' product literature is usually the slope of the characteristic curve from 25°C to 125°C (0°C to 50°C and 25°C to 50°C values are also common). From unit to unit within a production lot, the variations will be on the order of ±1% to ±3%. From lot to lot, however, variations of up to ±5% overall are possible for some material systems.

The metallized surface contact type thermistors exhibit smaller variations from unit to unit within a production lot thus giving them a slight advantage in cost.

RESISTANCE LIMITS:

When thermistors are selected by nominal resistance and tolerance at a single reference temperature, the result is a resistance-temperature limits envelope such as shown in Figure 5. The maximum and minimum resistance values at the reference temperature are fixed by the specified tolerance. As the temperature is changed from the reference temperature, however, the maximum and minimum limits (as percentage of the nominal resistance) will spread out.

If the temperature span is small enough so that the beta can be considered constant, then equation (14) can be used to solve for the minimum and maximum resistance values. The limits are solved for the conditions of high and low nominal resistance, and high and low nominal beta. The four equations which can be used to define the envelope are shown in Figure 5.

Example: Given $R_N = R_{TO}$ @ T_O = 10000 Ohms @ 25°C

β = 3450 Kelvins

x = (resistance tolerance) = ±10% = ±.1

y = (beta tolerance) = ±5% = ±.05

T_L = 15°C and T_H = 35°C

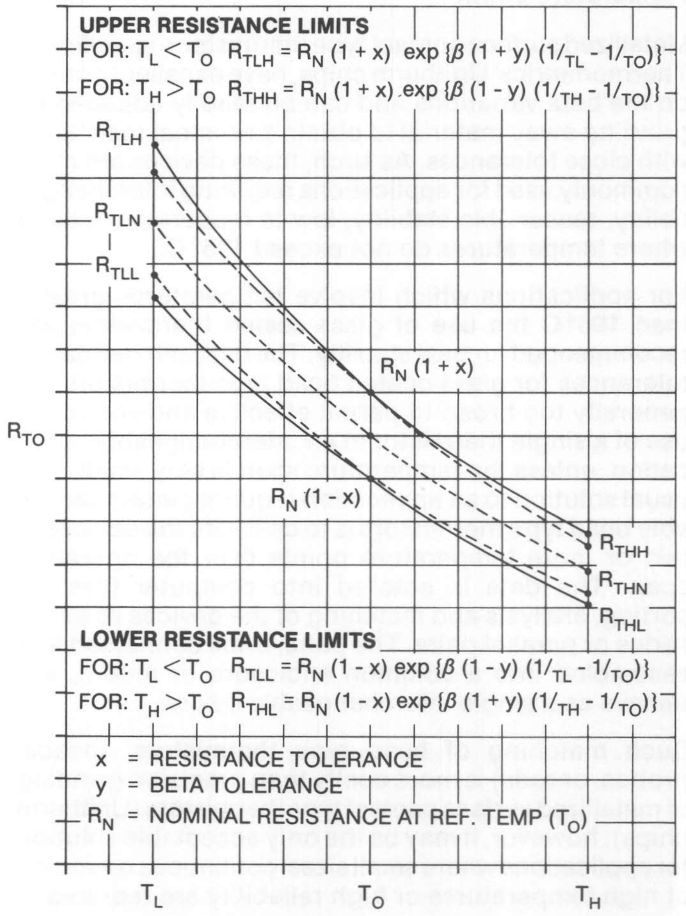
R_{TLH} = 16769.3 Ohms	R_{THH} = 7699.5 Ohms
R_{TLN} = 14941.7 Ohms	R_{THN} = 6869.4 Ohms
R_{TLL} = 13180.3 Ohms	R_{THL} = 6067.5 Ohms

The resistance tolerance at 15°C is (+12.23%, -11.79%), and is (+12.08%, -11.67%) at 35°C, as compared to the nominal tolerance of ±10% @ 25°C.

The effect of beta tolerance on the resistance limits must be considered in any thermistor application. The resistance limits will spread as the difference between the operating temperature and reference temperature is increased. Therefore, in many high or low temperature applications it is desirable to specify the nominal resistance at the operating temperature or at a convenient mid point in the operating temperature range.

FIGURE 5

EFFECT OF BETA TOLERANCE ON RESISTANCE LIMITS



CURVE MATCHING AND INTERCHANGEABILITY:

For some applications the operating temperature range is too wide to permit the proper use of equation (14). In such cases, or in cases where it is desirable to have a uniform tolerance over the range, the resistance limits are specified for the minimum and maximum operating temperatures. This two point constraint (actually, a limitation on the beta) requires that devices be selected to closely track a given resistance-temperature or ratio-temperature characteristic. After the thermistors are manufactured they would be limit tested at the minimum and maximum operating temperatures. The cost of such "curve matching" will obviously depend upon the resistance tolerance (or ratio tolerance) desired and the operating range.

Thermistors which have very close resistance tolerances and which can be readily substituted without the need for circuit adjustments and recalibration are called "Interchangeables." Very often these devices have curve tolerances which are expressed as a temperature uncertainty over the operating range rather than as a resistance uncertainty. When the curve tolerance is so expressed, the resistance limits at the low temperature point will be slightly greater than the resistance limits at the high temperature point. This is due to the greater values for the temperature coefficient of resistance (alpha) at lower temperatures. It follows then, that when curve tolerances are given as a resistance uncertainty, the temperature uncertainty will be lesser at the low temperature point and greater at the high temperature point.

Metallized surface contact type thermistors, specifically Thermometrics' Unitherm chips, have excellent control on the beta variations and can be readily adjusted by grinding away material to obtain a nominal resistance with close tolerances. As such, these devices are most commonly used for applications requiring interchangeability, reasonable stability, low to moderate cost and where temperatures do not exceed 105° C.

For applications which involve temperatures greater than 105° C the use of glass sealed thermistors are recommended for best stability. The beta and resistance tolerances for glass coated bead type thermistors are generally too broad to permit effective and economic use of a single thermistor in an interchangeable application, unless the temperature span is very small. The usual solution to an application requiring interchangeable bead type thermistors is to calibrate the devices at two or more temperature points over the operating span. The data is entered into computer files for sorting, analysis and matching of the devices as either series or parallel pairs. The pairs, once connected and assembled into a common enclosure or mount, will behave as a single interchangeable device.

Such matching of bead type thermistors, (beads, probes, or rods) is more costly than precision grinding of metallized surface contact type thermistors (Unitherm chips); however, it may be the only acceptable solution for applications where small sizes, continuous operation at high temperatures or high reliability are required.

Practical limits for interchangeability are determined by the ability to control the tolerances on resistance and beta over the desired temperature range. Cost effective limits for most thermistors (bead types or chips) operated in the overall range of 0° C to 105° C would be curve tolerances of: ±0.05° C for spans of up to 50° C, ±0.1° C over spans of up to 75° C, and ±0.2° C for spans of up to 100° C.

CALIBRATION:

Some applications have accuracy requirements which are tighter than the conventional limits on interchangeable devices. For these applications the thermistors must be calibrated at one or more temperatures so that the interpolation equations can be used. [Reference equations (14), (22), (23), (24), and (25)].

The accuracy of the resistance-temperature data over the temperature range depends upon the proper selection of equation and reference temperatures and upon the calibration accuracy. The resistance tolerance, or interchangeability, is a convenience only and has no influence on the accuracy of the calibrations. Thus, low cost, broad tolerance devices can be used.

Table 4 lists the calibration schedules available for any of the thermistors or assemblies manufactured by Thermometrics.

Obviously, not all thermistors or assemblies can be calibrated at all temperatures over the range. There will be limitations which are imposed by the type of thermistor and its nominal resistance as well as by the materials used in the construction of an assembly.

The basic calibration schedules and the types of thermistor to which they apply are described as follows:

SCHEDULE 1: Available only for thermistor standards, ultrastable thermistor probes or assemblies which incorporate these devices. Calibrations are made in an integrating block submerged in a precision constant temperature bath. The bath and block temperature is established using an SPRT, resistor standards and four wire comparison bridge. Resistance measurements of the thermistors are made using a precision Wheatstone bridge verified against standard resistors and an ohmic standard precision resistance decade.

SCHEDULE 1A: Available only for thermistor standards, ultrastable thermistor probes or assemblies which incorporate these devices. The bath and block temperature is established using two or more themistor temperature standards which have been calibrated against an SPRT. Resistance measurements are performed the same as for Schedule 1.

SCHEDULE 2: Available for all glass probe thermistors or assemblies which incorporate these devices. Stability requirements with respect to temperature range and time span must be verified prior to calibration. The bath and block temperature is established using two or more thermistor temperature standards which have been calibrated against an SPRT. Resistance measurements are performed using a precision Wheatstone bridge verified against an ohmic standard resistance decade.

SCHEDULE 3: Available for all glass enclosed beads and probes as well as epoxy encapsulated discs or chips and sensor assemblies using these devices. It is advised that stability required be verified prior to calibration. A precision constant temperature bath is set using two or more thermistor temperature standards. Resistance measurements are performed using a precision Wheatstone bridge verified against an ohmic standard resistance decade.

SCHEDULE 4: Available for all thermistors and sensor assemblies. A constant temperature bath is set using two or more thermistor standards. Resistance measurements are performed using a calibrated Wheatstone bridge or digital meter, or data acquisition system.

SCHEDULE 5: Available for all thermistors and sensor assemblies. A production temperature bath is set using two or more thermistor standards. Resistance measurements are performed using a digital meter.

In addition to the calibration services described above, Thermometrics can provide the constants for any of the equations given in the previous discussions. Computer generated tables of resistance versus temperature can also be furnished for any calibrated thermistor or assembly.

TABLE 4

CALIBRATION SCHEDULE	RESISTANCE ACCURACY	TEMPERATURE ACCURACY (± °C) FOR RANGES SHOWN:				
		-140° C to -80° C	-80° C to 0° C	0° C to 60° C	60° C to 125° C	125° C to 260° C
1	0.005 %	.005	.003	.0015	.003	.005
1A	0.005 %	▨	.005	.005	.005	▨
2	0.01 %	.005	.005	.005	.005	.005
3	0.01 %	.01	.01	.01	.01	.01
4	0.05 %	.05	.05	.05	.05	.05
5	0.1 %	.05	.05	.05	.05	.05

TRACEABILITY:

Temperature measurements at Thermometrics are traceable to International Practical Temperature Scale of 1968 (IPTS-68) as maintained by the National Bureau of Standards (NBS). Traceability is achieved by means of triple point of water cells for the defining fixed point of 0.01° C (273.16K) and through the use of standard platinum resistance thermometers (SPRT) calibrated by NBS at other points. In the text of IPTS-68, the standard platinum resistance thermometer is specified as the standard interpolation instrument for realizing the scale between the defining fixed points.

The range of -140° C to +260° C is defined by fixed points at the boiling point of oxygen (-182.962° C), triple point of water (0.01° C), freezing point of tin (231.9681° C) and freezing point of zinc (419.58° C). The temperature uncertainties for calibrations at Thermometrics are 0.0002° C at the triple point of water, 0.0015° C between 0° C and 60° C, 0.003° C between 60° C and 125° C and 0.005° C for other temperatures in the range of -140° C to 260° C.

Upon request, for a nominal fee, documentation for traceability to the National Bureau of Standards can be furnished for all calibrations performed at Thermometrics.

QUALITY ASSURANCE:

Thermometrics maintains a system which complies with MIL-Q-9858. All of our bead and chip thermistors are designed to comply with MIL-T-23648. Every Thermometrics thermistor receives 100% electrical, visual, and mechanical inspection in addition to QA sampling which varies with the applications requirements (typically 0.65 AQL or 1.0 AQL). Our Applications Engineering Department will gladly provide assistance in selecting the best qualification and acceptance testing programs for any specific application. We can provide low cost screening tests or sophisticated qualification testing depending upon your requirements.

APPLICATIONS ASSISTANCE:

Thermometrics has earned its reputation as "The Source of Thermistor Expertise." Our applications engineers are among the most knowledgeable in the world and are ready to assist you with your thermistor and sensor assembly selections. We are familiar with low cost screw-machine parts, molded parts and space-approved materials. Your inquiries for assistance are welcomed.

APPLICATIONS:

The thermistor is a versatile component that can be used in a wide variety of applications where the measurand is temperature dependent. Table 1 (inside front cover) gives a partial listing of such applications and they are grouped according to one of the three fundamental electrical characteristics which were previously discussed.

Obviously, there are other specific applications which are not listed and each technological advance by society will bring forth new applications for thermistors. At Thermometrics, we welcome the opportunity to discuss new applications or to provide information or assistance on any specific problem.

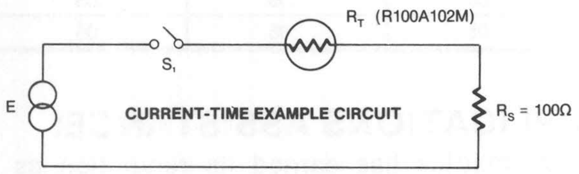
APPLICATIONS BASED ON CURRENT-TIME CHARACTERISTIC:

Time delay, surge suppression and sequential switching represent some of the earliest, high volume uses of thermistors. These applications are all based upon the current-time characteristic of a thermistor which was briefly described in the section of thermal and electrical properties.

Figure 6 shows a simple circuit and the resulting current-time characteristic for the thermistor suspended by its leads in still air at 25° C. The thermistor selected for the example is Thermometrics part R100A102M. The thermal and electrical properties of this device are given on page C7, C8 of the Thermistor Catalog. The nominal resistance at 25° C of the thermistor is 1000 Ohms, the dissipation constant in still air at 25° C is 1.0 mW/° C and the thermal time constant is 22 seconds.

When switch S1 is closed there will be an initial current which is determined by the source voltage and the circuit resistance (sum of zero-power resistance of thermistor at ambient temperature and other circuit resistances). The initial rate of current change will be low due to the high resistance of the thermistor, however, as the thermistor self-heats and its resistance decreases, the rate of current change will increase. The rate of current change will begin to diminish as the circuit approaches an equilibrium condition. At this time the circuit current will reach the maximum and the thermistor will reach its maximum self-heated temperature.

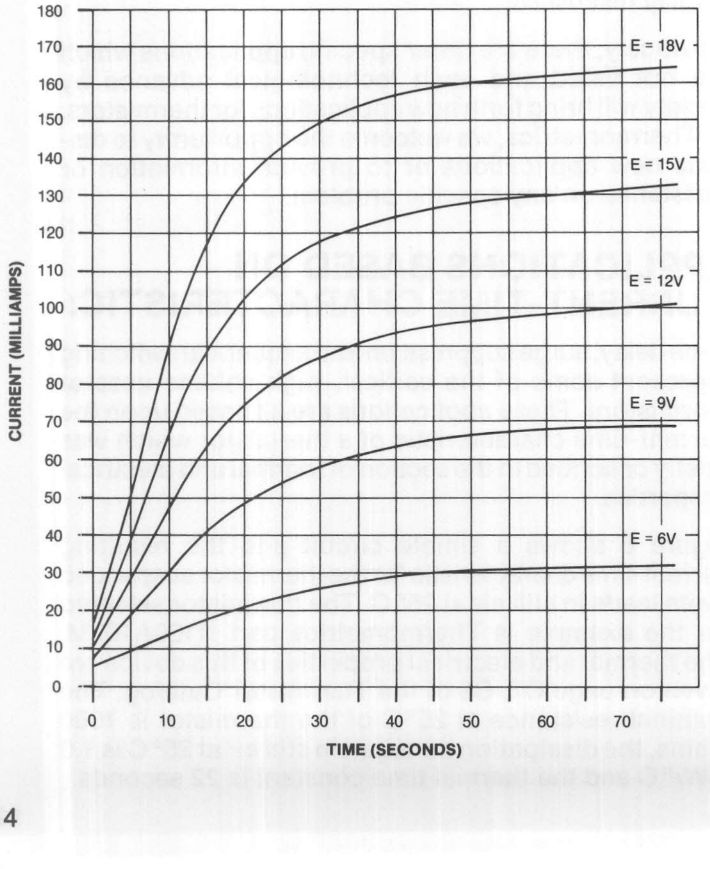
FIGURE 6A



The current-time characteristic is shown for various values of source voltage with all other parameters remaining fixed. Obviously, the shape of the current-time characteristic can be altered by changing the fixed resistance of the circuit or by changing the ambient temperature and hence the zero-power resistance of the thermistor. The current-time characteristic can also be changed if the dissipation constant or heat capacity of the thermistor are altered, such as by mounting or encapsulation of the device.

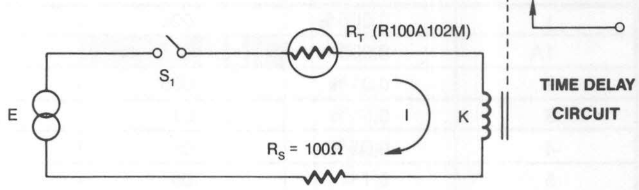
FIGURE 6B

CURRENT TIME CHARACTERISTIC



A simple time delay circuit can be made by using a relay in series with, or in place of, the fixed resistor. A DC relay is used with a DC source and an AC relay with an AC source. Figure 7 shows such a simplified circuit. The relay will be energized when the circuit current reaches the rated operating current for the relay. By careful selection of circuit parameters it is possible to obtain time delays ranging from several milliseconds to several minutes.

FIGURE 7



When designing such circuits attention must be paid to the power ratings of the thermistor as well as the other circuit components. The thermistor must also be given sufficient time to cool down before the next cycle is initiated or else the time delay will not be consistent. To accomplish this repeatability, a second set of relay contacts is sometimes used to "short out" the thermistor after the relay has been energized. Thus, the current "latches in" at a steady value with the thermistor shunted out of the circuit and the thermistor has ample time to cool down to ambient temperature. For applications where repeatability of the time delay is important, the thermistor must be kept under a controlled ambient temperature. Since this can involve considerable effort and expense, a thermistor time delay circuit is seldom used for a precise time period. The usual application involves a minimum time delay requirement to prevent an action or event from occurring until a certain time period has elapsed.

The thermistor current-time characteristic can be used to discriminate against high voltage spikes of short duration and against initial current surges. The typical surge protection application involves filaments in vacuum tubes or light bulbs. When the filaments are cold they have a low resistance and so the initial current at 'turn on' can be high. This current surge can shorten the useful life of the filament. When a thermistor is connected in series with the filament, however, the initial current will be low due to the high resistance of the thermistor. As the thermistor self-heats its resistance will decrease and the current gradually increases in the circuit thus protecting the filaments.

Applications of sequential switching involve the use of two or more time delay circuits. The circuits can involve series or parallel combinations of thermistors and loads and are designed such that the individual thermistor-load combinations operate in a prescribed sequence. The choice of thermistor and circuit parameters determine the time delays and thus the sequence of events.

In all applications based upon the current-time characteristic proper consideration must be given to the peak instantaneous power applied to the thermistor. The thermistor may be damaged if voltage, current or power ratings of the device are exceeded.

APPLICATIONS BASED ON VOLTAGE-CURRENT CHARACTERISTICS:

All applications based on the voltage-current characteristic use one or more thermistors which are operated in a self-heated, steady state condition. In the section dealing with Electrical Properties we described the static voltage-current characteristic. This characteristic can be expressed mathematically (equation 8) and can be graphically plotted on log-log coordinates (Figure 2) or on linear coordinates (Figure 3).

Table 5 summarizes the most common applications based upon the voltage-current characteristic and their grouping according to the type of excitation as discussed in the section on Electrical Properties. The excitations are thermal or electrical and will vary the self-heated thermistor operating point. The operating point is defined as the intersection of the voltage-current characteristic and the load line. The load line is obtained by considering the Thevenin equivalent circuit with respect to the thermistor terminals.

TABLE 5 — APPLICATIONS BASED ON VOLTAGE-CURRENT CHARACTERISTICS:

GROUP 1 - DISSIPATION CONSTANT CHANGED:

Vacuum Manometers
Anemometers
Flow Meter
Fluid Level Control/Alarm
Fluid Velocity
Thermal Conductivity Analysis
Gas Detection
Gas Chromatography/Analysis

GROUP 2 - ELECTRICAL PARAMETERS CHANGED:

Automatic Gain/Level Control
Amplitude Control
Voltage Regulation
Volume Limiting
Signal Expansion/Compression
Switching Devices

GROUP 3 - AMBIENT TEMPERATURE CHANGED:

Temperature Control
Alarm Indication

GROUP 4 - RADIATION ABSORBED CHANGED:

Microwave Power

Small signal analysis and analytical analysis of self-heated thermistor circuits are normally not performed. The typical solution of self-heated thermistor applications involves large signal analysis by graphical methods. As such, the first step in any solution is to derive the voltage-current characteristic curve or family of curves.

In order to do this, certain assumptions must be made and data on dissipation constants as well as resistance-temperature characteristics must be given. From our earlier discussion concerning the dissipation constant we observed that it was slightly dependent on both temperature and temperature difference. For the purpose of deriving the curves, the dissipation constant variations due to temperature and temperature difference are considered negligible. Thus, the dissipation constant is considered to be fixed by the specified medium and given conditions.

The resistance-temperature data can be presented in many ways and any of the intrinsic or extrinsic equations can be used for interpolations. For most thermistors, the temperature difference between the zero-power ambient condition and the peak of the voltage-current curve is relatively small. As such, the intrinsic equations can be used in this section of the curve between the ambient condition and the peak voltage. Beyond the peak voltage point of the curve, however, only the extrinsic equations should be used for computing the resistance-temperature characteristic since the temperature spans are generally too great to assume that the value for the material constant, β, remains a constant. In general, the extrinsic equations will provide better interpolation results.

From equation (8):

$$P = E_T I_T = \delta\,(T - T_A)$$

The approximate voltage-current characteristic can be derived from the above equation and the data given for the dissipation constant and the resistance-temperature characteristic as follows:

1.) Assume a value of constant power, P.

2.) Determine the thermistor temperature corresponding to this assumed power, where T_A is the given ambient temperature, hence:

$$T = T_A + P/\delta$$

3.) Determine the resistance of the thermistor at this operating temperature, R_T, using appropriate data tables or equations.

4.) Plot a data point on the voltage-current characteristic as follows:

a.) Log-log coordinates: Plot the point at the intersection of a line of constant power corresponding to P and a line of constant resistance corresponding to R_T.
b.) Linear coordinates: Compute the voltage and current values from the assumed power and corresponding resistance values and plot accordingly,

$$E_T = [\,P\,(R_T)\,]^{1/2} \qquad I_T = [\,P/R_T\,]^{1/2} \tag{31}$$

Repeat the above steps for each point desired until the curve is plotted. The task of plotting a curve or family of curves is easily accomplished by a personal computer having graphic plot capabilities.

Log-log coordinates are generally used to display the voltage-current characteristic in manufacturers' data sheets and they are useful for demonstrating the effects of a given type of excitation. Linear coordinates are generally more useful when trying to solve an actual circuit problem where a load line intersects a voltage-current characteristic curve or a family of such curves.

The temperature at which the peak of the voltage-current characteristic occurs (T_P)as well as the corresponding values of voltage and current (E_P, I_P) can be solved from a consideration of equations (8) and (11). Here again, an assumption is made that the value for beta β, is a constant over the relatively small temperature span between the zero-power ambient temperature (T_A) and the temperature at the peak of the curve (T_P).

Thus, it can be shown:

$$T_P = (\beta/2) - [(\beta/2)^2 - \beta T_A]^{1/2} \quad (32)$$

$$E_P = [R_P \delta (T_P - T_A)]^{1/2} \quad (33)$$

$$I_P = [\delta (T_P - T_A)/R_P]^{1/2} \quad (34)$$

The load line can be obtained by considering the Thevenin equivalent circuit with respect to the thermistor terminals. The equation for the load line is as follows:

$$E_T = E_{THEV} - I_T (R_{THEV}) \quad (35)$$

The first group of applications in Table 5 uses a change in the dissipation constant of the thermistor to cause the operating point to shift. This change in the dissipation constant can be produced by a change in the heat transfer from the thermistor to its surroundings, by a change in the thermal conductivity of the medium or by a change in the relative motion of the medium in which the thermistor is suspended.

The effect of the change in dissipation constant is to translate the voltage-current characteristic along a line of constant resistance since the ambient temperature and the zero-power resistance of the thermistor have not changed. For a constant amount of power applied, however, the temperature rise above ambient will be changed by a factor equal to the ratio of the change in dissipation constants. Figure (8A) illustrates this type of excitation.

The second group of applications in Table 5 use a change in the electrical parameters of the circuit to cause the operating point to shift. The change in electrical parameters is seen as a change in the Thevenin voltage or Thevenin resistance (or both) by the thermistor and the result is a translation or rotation (or both) of the load line with respect to the fixed voltage-current characteristic of the thermistor. For reasons of clarity, this type of excitation is almost always plotted on linear coordinates. Figure (8B) illustrates this type of excitation.

The third group of applications in Table 5 use a change in ambient temperature to cause the operating point to shift. Figure (8C) illustrates this type of excitation. It appears as if the voltage-current characteristic has been translated along a line of constant power, however, this is not correct. The resistance-temperature characteristic is non-linear and so the voltage-current characteristic curves must be generated for the new ambient temperature conditions.

The fourth group of applications in Table 5 use a change in the absorbed radiation of the thermistor to cause the operating point to shift. The effect is the same as if the temperature is changed. Figure (8D) illustrates this type of excitation.

In all of the applications involving self-heated thermistors consideration must be given to the maximum power ratings of the thermistor utilized. Excessive power levels can cause degradation of the thermistor or possibly even catastrophic failure.

Particular consideration must be given to the type of mounting. The heat transfer properties of the thermistor will be affected by the way the thermistor is mounted and will therefore show up as a change in the dissipation constant. For many of the applications it is desirable to have the thermistor suspended in such a fashion that it is isolated from the mount as much as possible. As an example, thermistor beads are suspended by their leadwires across a gap on a header or fixture for gaseous environments and long probes are used for immersion in liquid environments.

Another consideration in mounting is to insure that the desired excitation is applied to the thermistor and that other unwanted excitations are shielded from the thermistor. Many of the applications based on a change in the dissipation constant, for example, require that two self-heated thermistors be employed. One unit is exposed to a reference condition and the other is exposed to the reference plus the additional unknown parameter that is to be measured.

When the thermistors are selected so that they have matched characteristics, or the circuit is adjusted so that each of the thermistors behaves in a matched fashion, then we have a balanced bridge arrangement. Under identical conditions of ambient temperature, thermal conductivity and so forth, the bridge will be balanced and the output will be zero. When one thermistor of the matched pair is exposed to the reference condition plus the excitation, then the bridge becomes unbalanced and an output signal is generated. The amount of the unbalance, and therefore the bridge output signal, can be calibrated in terms of the parameter change causing the excitation.

FIGURE 8A

CHANGE IN DISSIPATION CONSTANT - BR14PA103N

δ_1 = 0.1 mw/°c (STILL AIR) δ_2 = 0.35 mw/°c (STILL HELIUM)

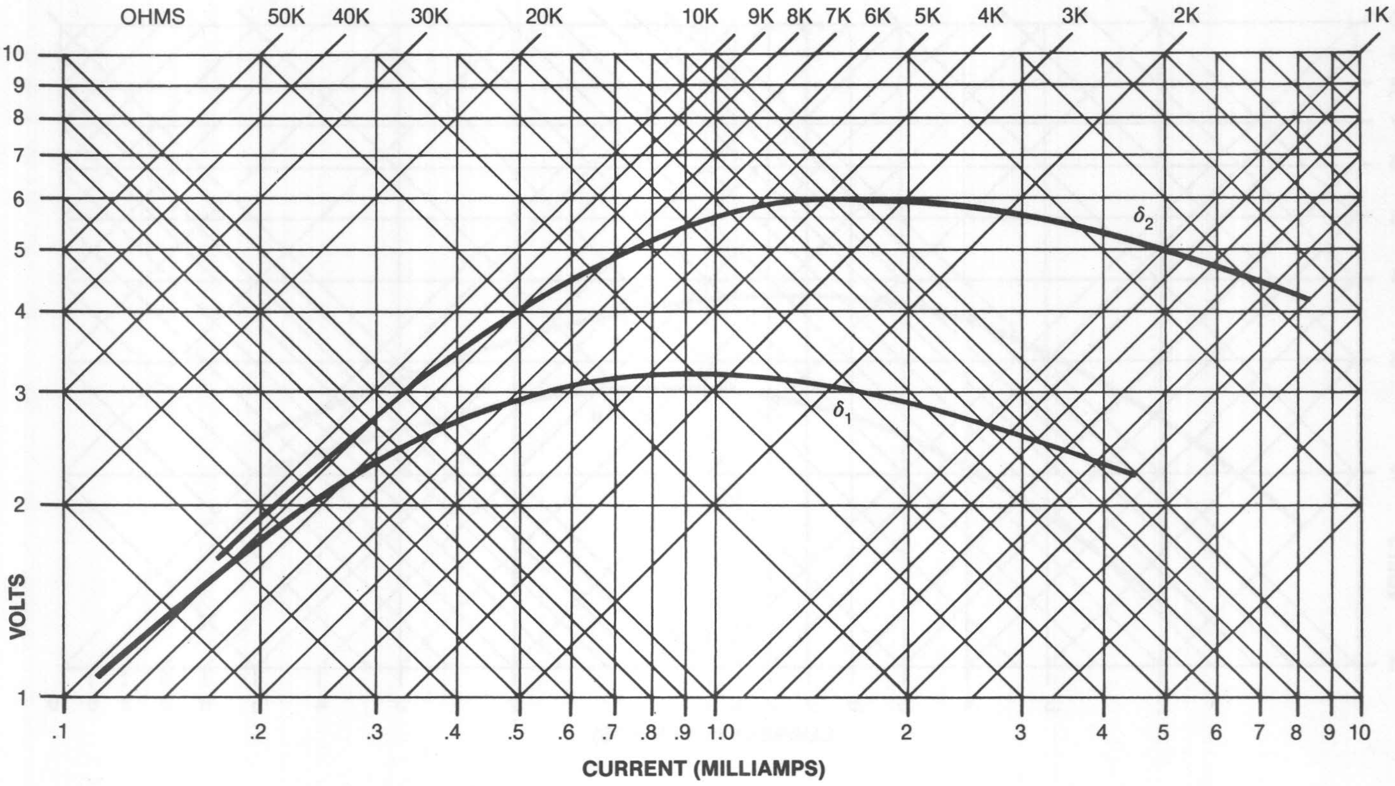


FIGURE 8B

CHANGE IN CIRCUIT PARAMETERS BR14PA103N

(STILL AIR AT 25° C)

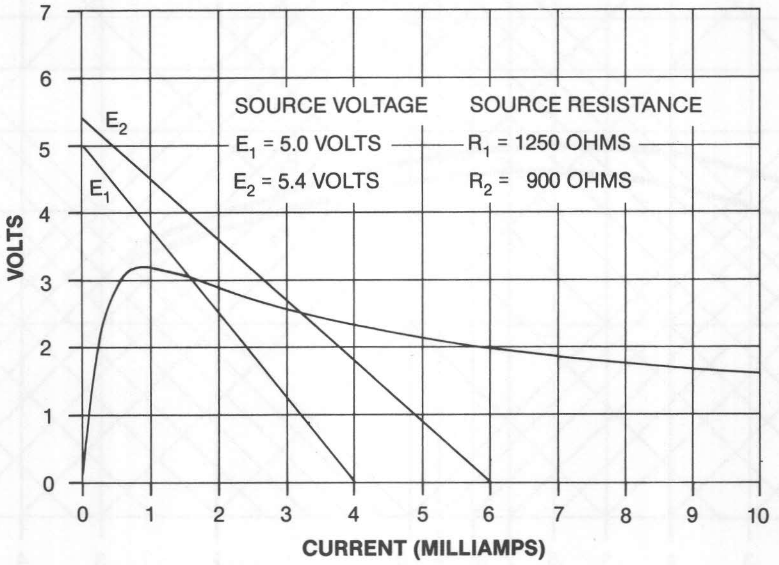


FIGURE 8C

CHANGE IN AMBIENT TEMPERATURE BR14PA103N $T_A = 15°C$ $T_B = 35°C$ (STILL AIR)

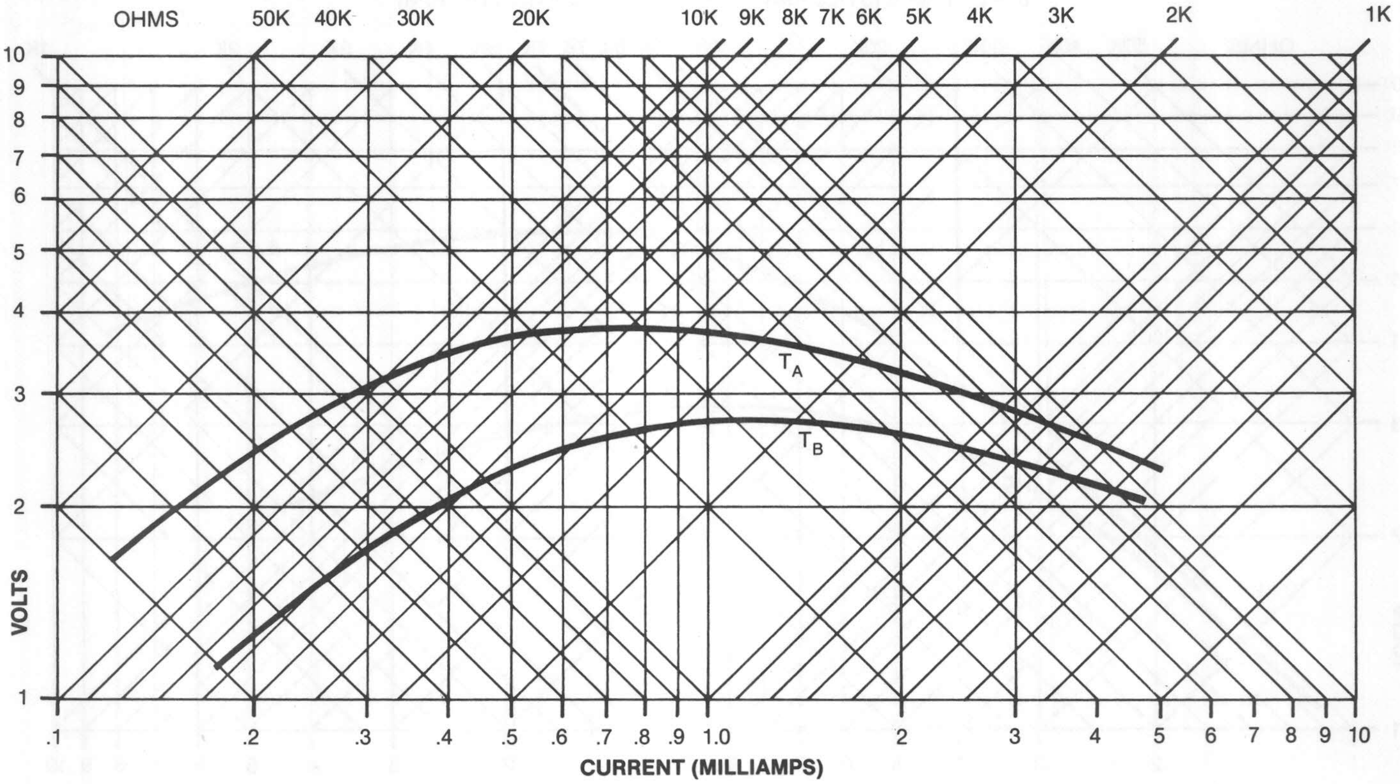
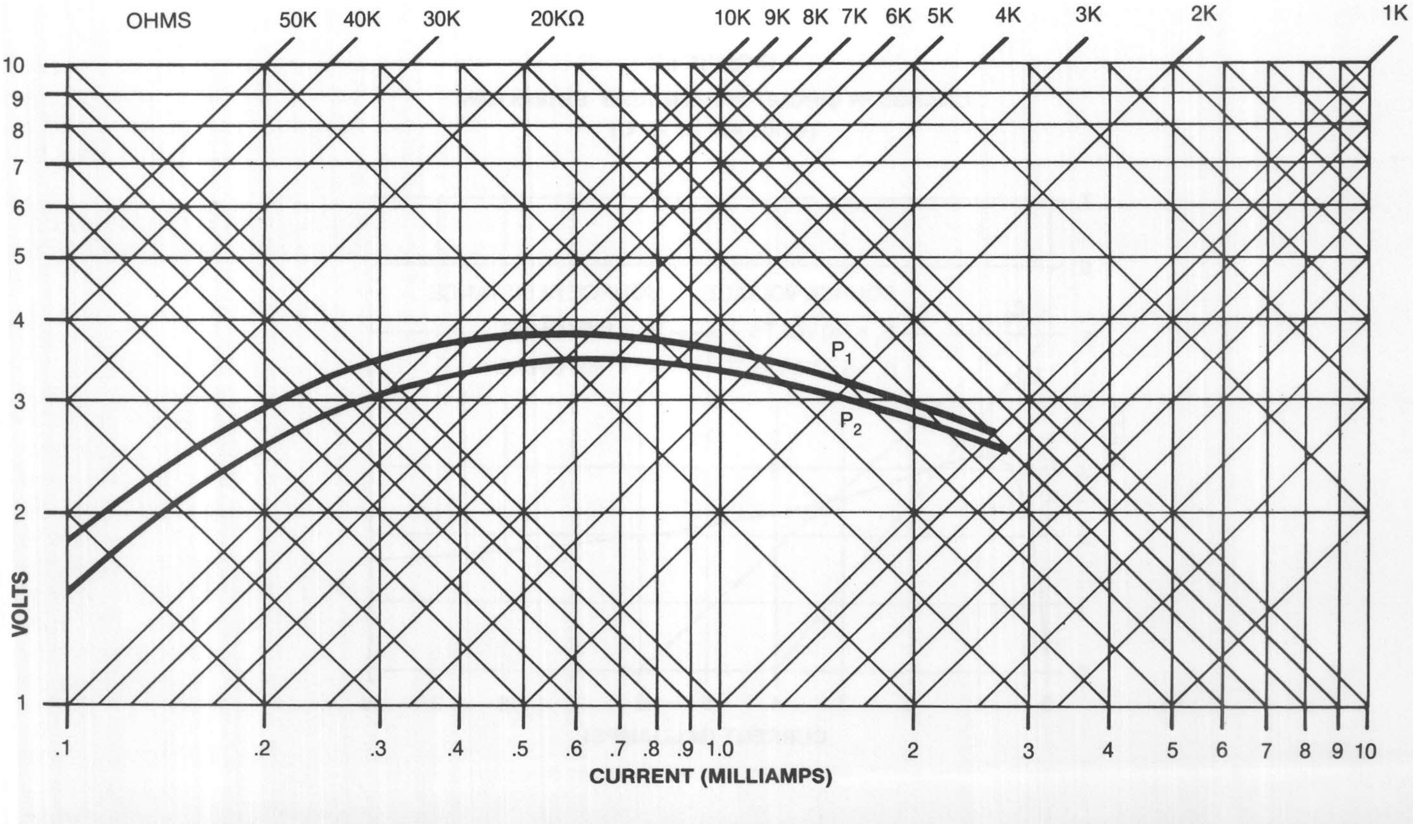


FIGURE 8D

CHANGE IN RADIATION BB07PA203N $P_2 > P_1$



APPLICATIONS BASED ON RESISTANCE-TEMPERATURE CHARACTERISTIC:

The large listing of applications based upon the resistance-temperature characteristic, as shown in Table 1, demonstrates the versatility and usefulness of thermistors. All of these applications involve some form of resistance thermometry, temperature control or temperature compensation.

Unlike the applications based upon the current-time or voltage-current characteristics, these applications require that the thermistor be operated in a zero-power condition. The section on Resistance-Temperature Characteristics goes into considerable detail regarding the intrinsic and extrinsic equations and their derivations. These equations, when used under the proper set of conditions, can accurately define the resistance-temperature characteristic of the thermistor.

Additional information regarding nominal curves, limits and tolerances, curve matching, interchangeability and calibration services are also discussed in the section on Resistance-Temperature Characteristics.

The primary funciton of the thermistor is to exhibit a change in resistance as a function of temperature. In an instrument/telemetry circuit this resistance is actually measured as either a voltage drop across the thermistor or a current through the thermistor. In most cases it is desirable that the output function of the circuit be linear with respect to temperature.

The output of a two-terminal network which exhibits a linear resistance-temperature characteristic and which is driven by a constant current source is a linear voltage-temperature function. Conversely, the output of a two-terminal network which exhibits a linear conductance-temperature characteristic and which is driven by a constant voltage source is a linear current-temperature function.

Consequently, the design of thermistor networks for most instrumentation/telemetry applications is focused on creating linear resistance-temperature or linear conductance-temperature circuits.

LINEAR VOLTAGE DIVIDER:

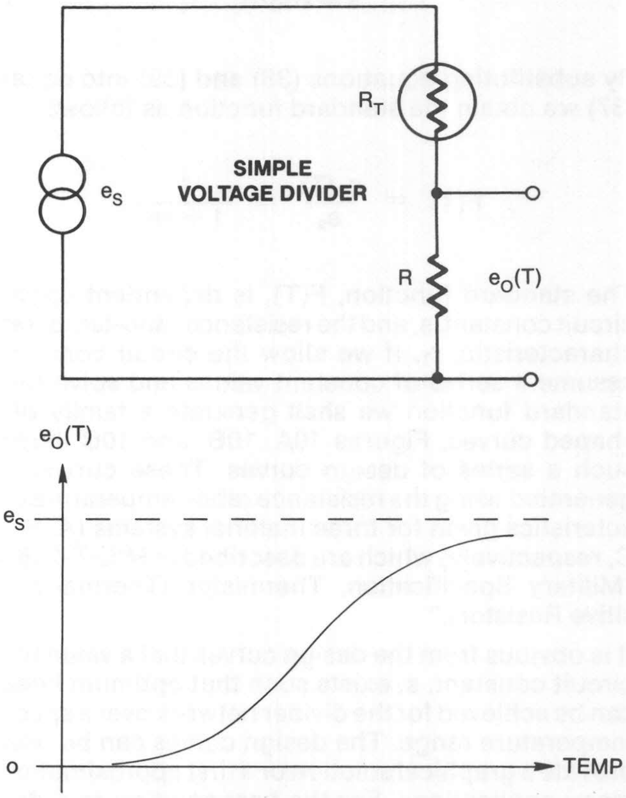
The simplest thermistor network used in many applications is the voltage divider circuit shown in Figure 9. In this circuit the output voltage is taken across the fixed resistor. This has the advantages of providing an increasing output voltage for increasing temperatures and allows the loading effect of any external measurement circuitry to be included into the computations for the resistor, R, and thus the loading will not affect the output voltage as temperature varies.

The output voltage as a function of temperature can be expressed as follows:

$$e_o(T) = e_s \left[R/(R + R_T) \right] \qquad (36)$$

From the plot of the output voltage we can observe that a range of temperatures exists where the circuit is reasonably linear with good sensitivity. Therefore, the objective will be to solve for a fixed resistor value, R, that provides optimum linearity for a given resistance-temperature characteristic and a given temperature range.

FIGURE 9



A very useful approach to the solution of a linearized voltage divider circuit is to normalize the output voltage with respect to the input voltage. The result will be a standard output function (per unit volt) that can be used in many design problems.

For the case of the voltage divider circuit under consideration we obtain the normalized output from equation (36) as follows:

$$\frac{e_o(T)}{e_s} = \frac{R}{R + R_T} = \frac{1}{1 + (R_T/R)} \qquad (37)$$

R_T is the zero-power resistance of the thermistor at a given temperature, T, and R_{TO} is the zero-power resistance of the thermistor at a standard reference temperature, T_O. In most thermistor literature the standard reference temperature, T_O, is 25° C (298.15K) and the thermistors are cataloged by their nominal resistance value at 25° C. The usual practice is to furnish resistance ratio versus temperature information for each type of thermistor and material system (composition of metal oxides) listed in the catalog. Thus, the thermistor resistance is normalized with respect to its resistance at the specified reference temperature.

$$r_T = R_T/R_{TO} \quad \therefore \quad r_T R_{TO} = R_T \qquad (38)$$

Note: It is desirable in many applications for T_O and R_{TO} to be specified at the midpoint of the desired operating temperature range.

The ratio of the zero power resistance of the thermistor at the desired reference temperature to the fixed value resistor is a constant which we shall call "s".

Thus:

$$s = R_{TO}/R \qquad (39)$$

By substituting equations (38) and (39) into equation (37) we obtain the standard function as follows:

$$F(T) = \frac{e_o(T)}{e_s} = \frac{1}{1 + sr_T} \qquad (40)$$

The standard function, F(T), is dependent upon the circuit constant, s, and the resistance ratio-temperature characteristic, r_T. If we allow the circuit constant to assume a series of constant values and solve for the standard function we shall generate a family of "S" shaped curves. Figures 10A, 10B, and 10C illustrate such a series of design curves. These curves were generated using the resistance ratio-temperature characteristics given for three material systems (A, B, and C, respectively) which are described in MIL-T-23648A, "Military Specification, Thermistor (Thermally Sensitive Resistor)."

It is obvious from the design curves that a value for the circuit constant, s, exists such that optimum linearity can be achieved for the divider network over a specified temperature range. The design curves can be used to provide a graphical solution or a first approximation for many applications. For the best solution to a design problem, however, an analytical approach is required. There are two analytical methods employed to solve for the optimum linearity conditions of the divider network. They are the "Inflection Point Method" and the "Equal Slope Method."

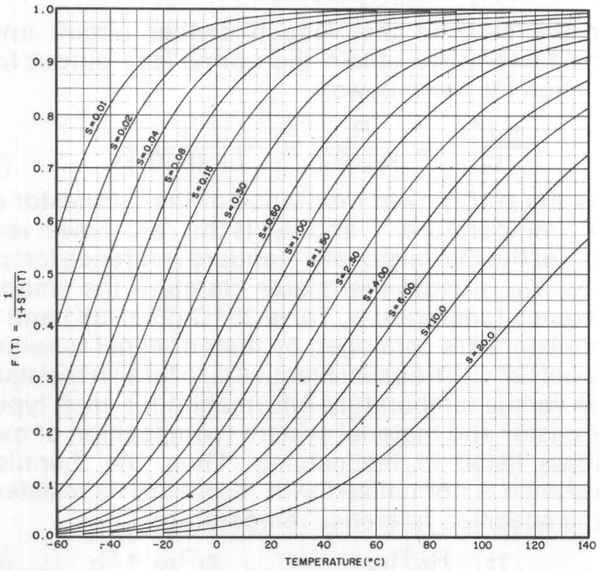


FIGURE 10A "A" MATERIAL

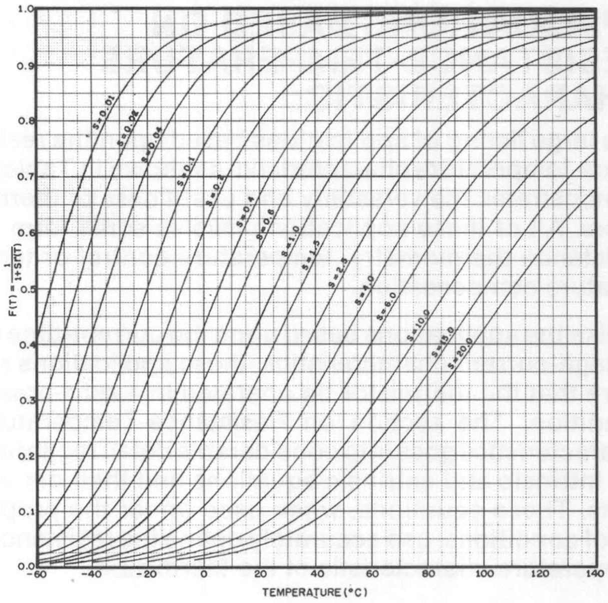


FIGURE 10B "B" MATERIAL

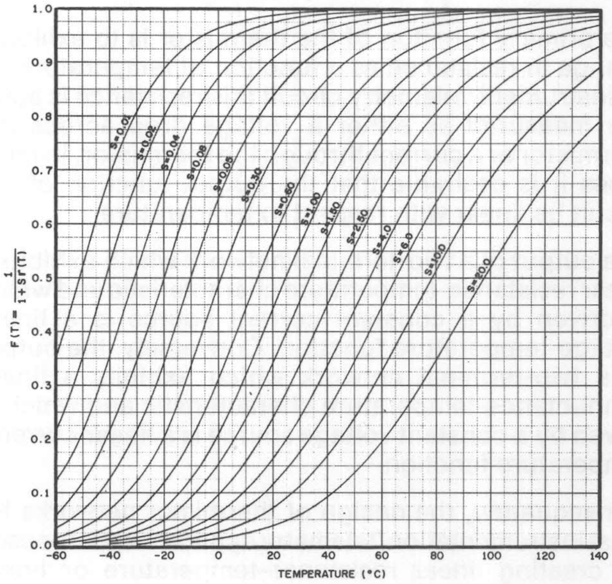


FIGURE 10C "C" MATERIAL

INFLECTION POINT METHOD:

In this method it is desired to have the inflection point of the standard function occur at the midpoint of the operating temperature range. The inflection point is the point where the slope of the curve is a maximum. The sensitivity of the divider network would therefore be at a maximum at this point. This method is recommended for the solution of temperature control applications.

This method, however, does not provide good linearity over wide temperture ranges. Its use should be restricted to temperature spans that are narrow enough for beta to be considered constant and thus the intrinsic equations can be used.

At the inflection point the slope of the standard curve (first derivative with respect to temperature) is at a maximum and the curvature (second derivative with respect to temperature) is zero. The reference temperature will be selected as the midpoint temperature of the desired operating range. Thus we have the condition:

$$\frac{d^2F(T)}{dT^2} = 0 \quad \text{at} \quad T_{MID} = T_O = (T_L + T_H)/2$$

Since the temperature range is small we can use equation (14) to solve for the resistance ratio-temperature characteristic, where $T_L \leq T \leq T_H$, as follows:

$$r_T = R_T/R_{TO} = \exp\{\beta\,(1/T - 1/T_O)\} \qquad (41)$$

We can solve for the circuit constant, s, by substituting equation (41) into equation (40), taking the second derivative with respect to temperature and setting it equal to zero. It can be shown that the solution is:

$$s = R_{TO}/R = (\beta + 2T_O)/(\beta - 2T_O) \qquad (42)$$

EQUAL SLOPE METHOD:

In this method it is desired to set the slopes of the standard function equal to each other at the endpoints of the temperature range (T_L and T_H). This method can provide good linearity over wider temperature ranges. When using this method for solution, the extrinsic equations for the resistance-temperature characteristic are used, specifically, equations (22) and (25) are most commonly used with this method. These equations provide suitable interpolation accuracies for most linearized network applications. When we set the slopes of the standard function at each endpoint temperature equal to each other we establish the following conditions:

$$\left.\frac{dF(T)}{dT}\right|_{T=T_L} = \left.\frac{dF(T)}{dT}\right|_{T=T_H} \qquad (43)$$

By substituting equation (38) into equations (22) and (25) we obtain the following equations:

from eqn. (22):

$$r_T = \exp\{(A_0 - \ln R_{TO}) + A_1/T + A_2/T^2 + A_3/T^3\} \qquad (44)$$

from eqn. (25):

$$r_T = \exp\{(B_0 - \ln R_{TO}) + B_1/T + B_3/T^3\} \qquad (45)$$

These equations, in turn, are substituted into equation (40) and then into equation (43) in order to obtain a solution for the exact value of the circuit constant, s. A general equation for the solution of the circuit constant can be given as follows:

$$s = \frac{X - Y}{Yr_{TL} - Xr_{TH}} \qquad (46)$$

The values for X and Y can be computed from the following equations. Note that the computations are different and depend upon the correct use of either the full third degree polynomial [equation (22) and (44) were used in the solution] or the modified third degree polynomial [equation (25) and (45)] were used in the solution.

When using the full third degree polynomial,
Reference equations (22) and (44):

$$X = T_H\,[r_{TL}(A_1 + 2A_2/T_L + 3A_3/T_L^2)]^{1/2} \qquad (47)$$

$$Y = T_L[r_{TH}(A_1 + 2A_2/T_H + 3A_3/T_H^2)]^{1/2} \qquad (48)$$

When using the modified third degree polynomial,
Reference equations (25) and (45):

$$X = T_H[r_{TL}(B_1 + 3B_3/T_L^2)]^{1/2} \qquad (49)$$

$$Y = T_L[r_{TH}(B_1 + 3B_3/T_H^2)]^{1/2} \qquad (50)$$

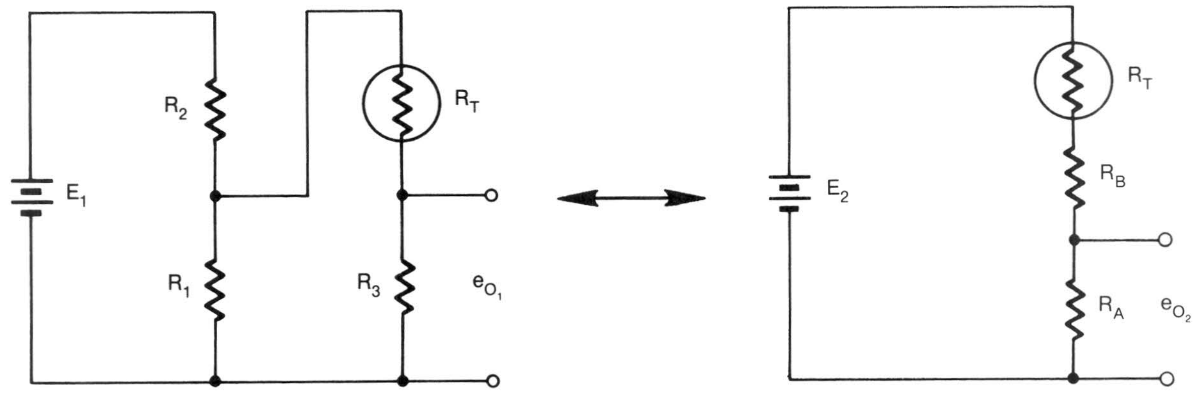
All of the linearization methods and equations discussed so far have been based on a single thermistor voltage divider. When the thermistor is connected to more complex circuits which contain only resistances and voltage sources, the problem can be reduced back to the simple voltage divider by considering the Thevenin equivalent circuit as seen at the thermistor terminals. As a short refresher, the Thevenin voltage is the open circuit voltage across the thermistor terminals and the Thevenin resistance is the resistance seen by the thermistor with the voltage source short circuited.

MODIFIED VOLTAGE DIVIDER CIRCUITS:

Figure (11) shows two simple modifications to the basic thermistor voltage divider which can be converted to or from a Thevenin equivalent circuit as required for a given application. The voltage divider of Figure (11A) is used where it is desired to reduce the output signal while Figure (11B) is used where it is desired to reduce the source voltage and translate the output signal by adding a bias voltage. Of the two circuits, Figure (11B) is more commonly used especially in bridge circuits. It permits the use of conventional source voltages and reduces the voltage placed across the thermistor to an acceptable minimum level of self heating. The bias voltage can be compensated in the bridge design.

FIGURE 11A

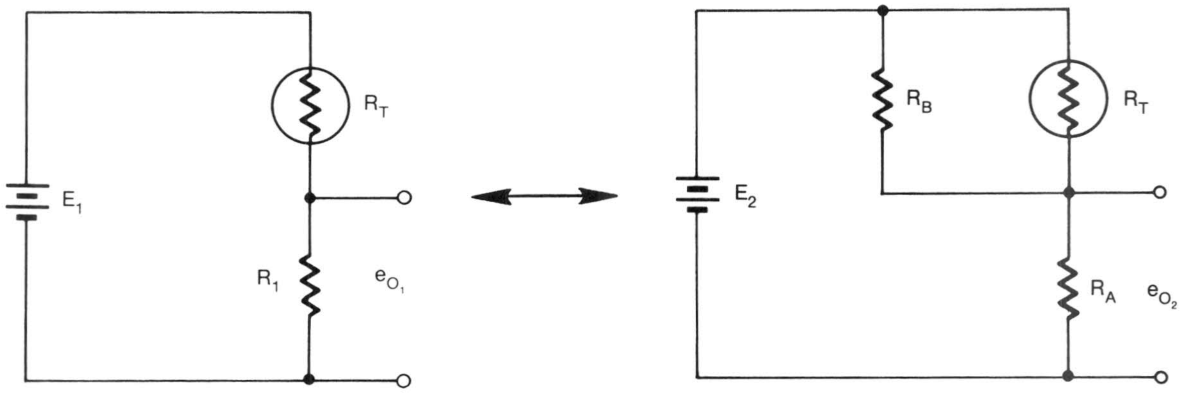
MODIFICATIONS TO VOLTAGE DIVIDER



$E_2 = E_1 [R_1 / (R_1 + R_2)]$
$e_{O_2} = [R_A / (R_A + R_B)] F(T) E_2$
$s = R_{TO} / (R_A + R_B)$

$R_A = R_3$
$R_B = R_1 R_2 / (R_1 + R_2)$
$F(T) = 1 / (1 + s r_T)$

FIGURE 11B



E_2 = AVAILABLE SOURCE VOLTAGE
E_1 = DESIGN SOURCE VOLTAGE
R_1 = SOURCE RESISTANCE FOR OPTIMUM LINEARITY
$e_{O_2} = (1-K) E_2 + K F(T) E_2$

$R_1 = R_A R_B / (R_A + R_B)$
$K = R_B / (R_A + R_B) = E_1 / E_2$
$F(T) = 1 / (1 + s r_T)$
$R_A = R_1 / K$
$R_B = R_1 R_A / (R_1 - R_A)$

BRIDGE CIRCUITS:

Bridge circuits are actually two voltage divider circuits. In most applications the bridge consists of a linear thermistor voltage divider and a fixed resistor voltage divider. For differential temperature measurement applications the bridge consists of matching thermistor linear voltage dividers. Figure (12A) illustrates a basic Wheatstone Bridge circuit with one linearized thermistor voltage divider and Figure (12B) illustrates the Wheatstone Bridge circuit used for differential temperature applications. Both of the circuits in Figure (12) represent cases where the load resistance is infinite and thus does not affect the output voltage of the voltage divider or dividers.

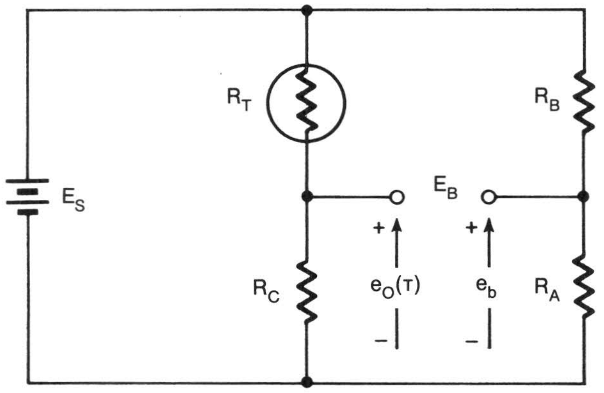
Figure (13A) shows the basic Wheatstone Bridge circuit for a finite load resistance. The Thevenin equivalent circuit for this bridge is shown in Figure (13B).

The Thevenin circuit shows again how a basically complex combination of resistances and voltage sources may be reduced to the simple voltage divider circuit.

When the modified voltage divider circuits of Figure (11A) and (11B) are used in the Wheatstone Bridge the results are the circuits of Figure (14) and Figure (15), respectively.

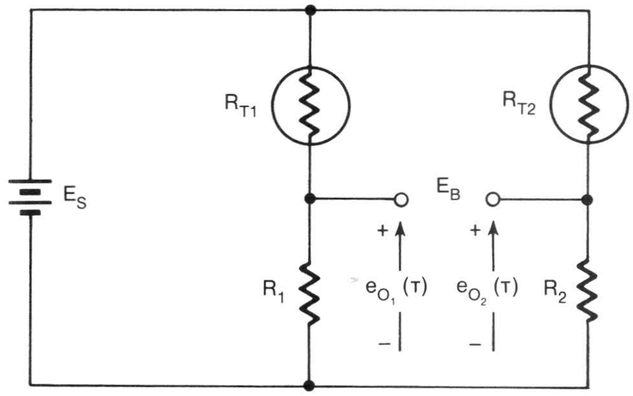
The source voltage in all of the Wheatstone Bridge circuits discussed so far has been considered an ideal source. If, in fact, the voltage source has an internal resistance, then it can be included in the circuit as shown in Figure (16A). In order to include this source resistance into the circuit computations we perform a basic $Y \leftrightarrow \triangle$ conversion. The result of the conversion is shown in Figure (16B).

FIGURE 12A



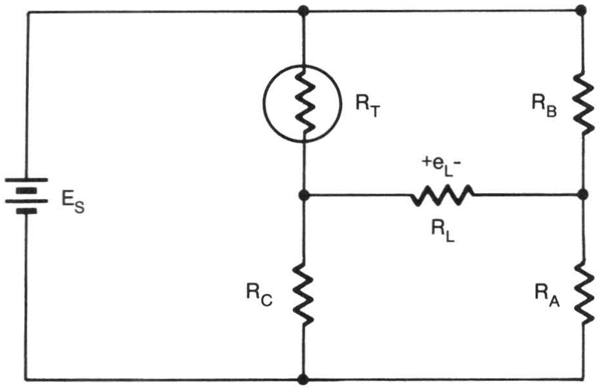
$$E_B = e_O(T) - e_b = E_s[F(T) - R_A/(R_A + R_B)]$$
$$F(T) = 1/(1 + sr_T)$$
$$s = R_{TO}/R_C$$

FIGURE 12B



$$E_B = e_{O_1}(T) - e_{O_2}(T) = E_S[F(T_1) - F(T_2)]$$
$$F(T_1) = 1/(1 + sr_{T1})$$
$$F(T_2) = 1/(1 + sr_{T2})$$
$$s = R_{T1_o}/R_1 = R_{T2_o}/R_2$$

FIGURE 13A



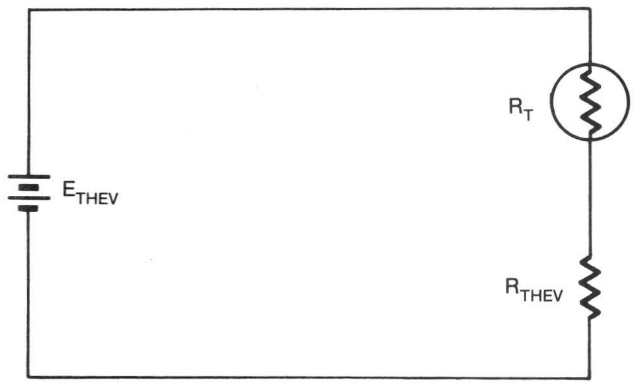
$$e_L = R_L E_S \left[\frac{R_C/(R_C + R_T) - R_A/(R_A + R_B)}{R_L + R_P + (R_C R_T/(R_C + R_T))}\right]$$

$R_P = R_A R_B/(R_A + R_B)$ $\qquad s = R_{TO}/R_{THEV}$

$i_L/E_S = K_1 F(T) + K_2$ $\qquad F(T) = 1/(1 + sr_T)$

$K_1 = [R_B R_C/A + R_A/B]$ $\qquad K_2 = [-R_A/B]$

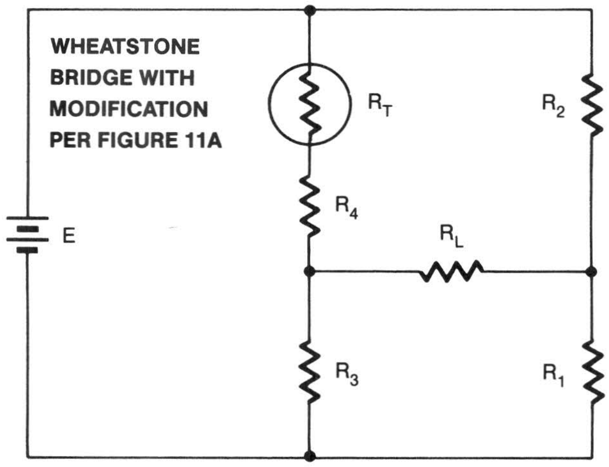
FIGURE 13B



$$R_{THEV} = R_{TO}/s = \frac{R_C[R_L + R_P]}{R_C + R_L + R_P} = \frac{A}{B}$$

$$E_{THEV} = \left[\frac{R_A(R_P + R_L) + R_C R_P}{R_A(R_P + R_C + R_L)}\right] E_S$$

FIGURE 14



WHEATSTONE BRIDGE WITH MODIFICATION PER FIGURE 11A

FIGURE 15

WHEATSTONE BRIDGE WITH MODIFICATION PER FIGURE 11B

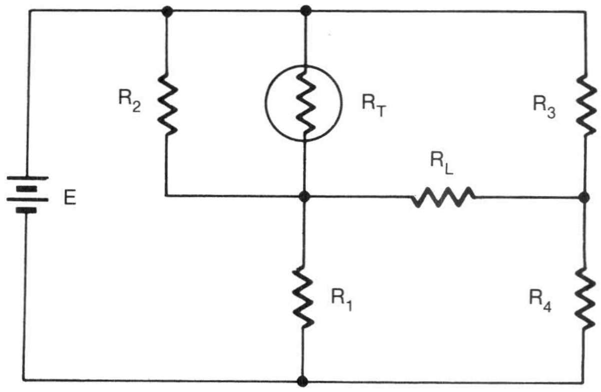
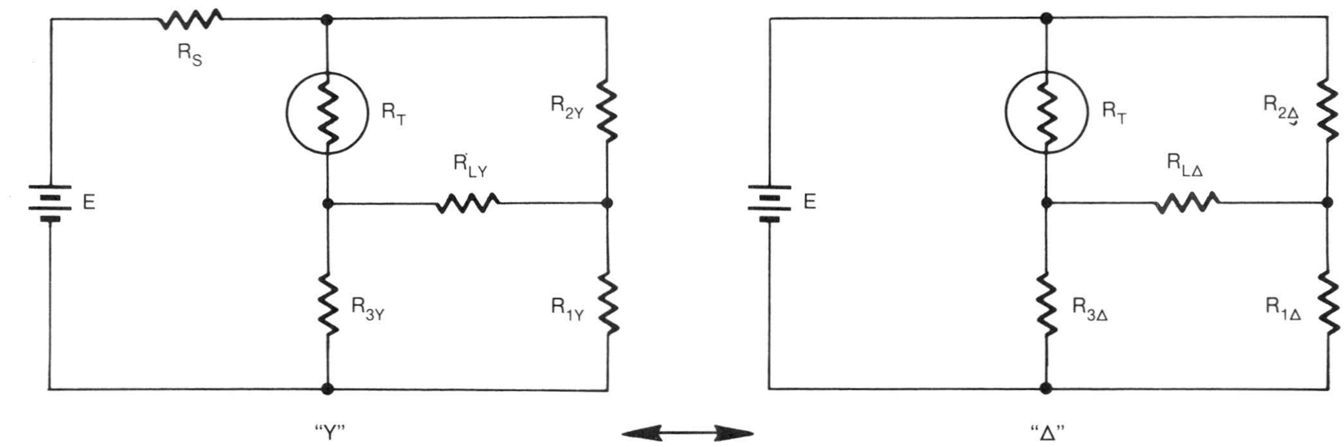


FIGURE 16



$$R_{3\Delta} = (R_{3Y}R_S + R_{1Y}R_S + R_{1Y}R_{3Y}) / R_{1Y}$$

$$R_{L\Delta} = \frac{R_{LY}\,(R_{3Y}R_S + R_{1Y}R_S + R_{1Y}R_{3Y})}{R_S\,(R_{LY} + R_{3Y} + R_{1Y}) + R_{1Y}R_{3Y}}$$

$$R_{1\Delta} = (R_{3Y}R_S + R_{1Y}R_S + R_{1Y}R_{3Y}) / R_{3Y}$$

$$R_{2\Delta} = R_{2Y}$$

$$R_{3Y} = (R_{3\Delta}R_{L\Delta}') / (R_{3\Delta} + R_{L\Delta}' + R_{1\Delta})$$

$$R_{1Y} = (R_{1\Delta}R_{L\Delta}') / (R_{3\Delta} + R_{L\Delta}' + R_{1\Delta})$$

$$R_S = (R_{1\Delta}R_{3\Delta}) / (R_{3\Delta} + R_{L\Delta}' + R_{1\Delta})$$

$$R_{L\Delta}' = (R_{L\Delta}R_{LY}) / (R_{L\Delta} - R_{LY})$$

OHMMETER CIRCUITS:

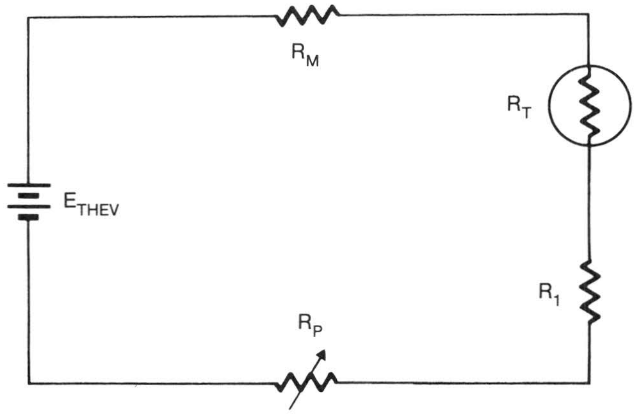
Another circuit which is commonly employed in temperature measurement applications is the basic Ohmmeter circuit which is shown in Figure (17). This circuit is also a basic voltage divider of sorts. It is generally used for low cost temperature measurement applications; thus, the trimming potentiometer may not always be in the circuit.

In the Ohmmeter circuit the objective is to produce a linear current. This current can be expressed as a constant times the standard function, F(T). The value of the constant is the source voltage divided by the circuit resistance as seen by the thermistor. Note that the circuit consisting of a thermistor in series with a fixed resistance is a linear conductance versus temperature network.

The voltage divider circuits, the Wheatstone Bridge circuits and the Ohmmeter circuit discussed so far have all been examples of linear conductance versus temperature networks. They may all be solved by the use of the standard function "S" curves, the inflection point method or the equal slope method as preferred.

FIGURE 17

OHMMETER CIRCUIT



LINEAR RESISTANCE NETWORKS:

Many applications based upon the resistance-temperature characteristic require the use of a linearized resistance network. Among the most common applications are networks to compensate for the positive temperature coefficient resistance changes of devices and circuits as well as coil windings in relays, motors, instrument movements or generators. Another important area of applications involve the need for a voltage which has a negative slope with respect to temperature in order to compensate for temperature drifts of amplifiers, oscillators or other circuits containing active components.

The linear conductance-temperature networks are driven by a constant voltage source, whereas, the linear resistance-temperature networks will be driven by a constant current source. Note that one is the dual of the other.

Figure (18) illustrates the basic linear resistance-temperature networks used in most compensation applications. The simplest network is obviously that shown in Figure (18A). If we normalize the network resistance with respect to the shunt resistor we observe that the standard function, F(T), can be used for the design of linear resistance networks.

In order to increase the overall network resistance to a higher value, a series resistor can be inserted as illustrated by Figure (18B). This can also be done to increase the voltage drop across the network when a constant current is applied to the terminals. Obviously, the linear resistance-temperature characteristic is translated by the series resistor and the slope remains unchanged.

Figure (18C) shows the circuit of Figure (18B) with the addition of a resistor in series with the thermistor. This circuit is used to permit the use of a standard value for the thermistor. The standard value thermistor must be slightly lower than the desired value for optimum linearity and both thermistors must have the same resistance ratio-temperature characteristics.

Figure (18D) shows the basic circuit of Figure (18A) with the addition of a resistor in series with thermistor, again for the purpose of utilizing a standard value of thermistor.

FIGURE 18A

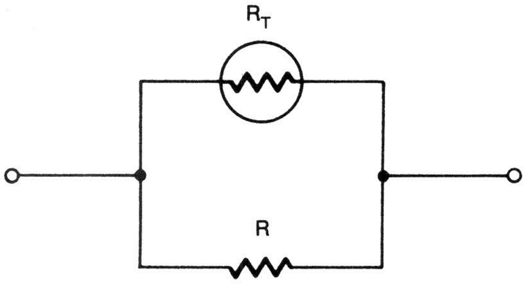


FIGURE 18B

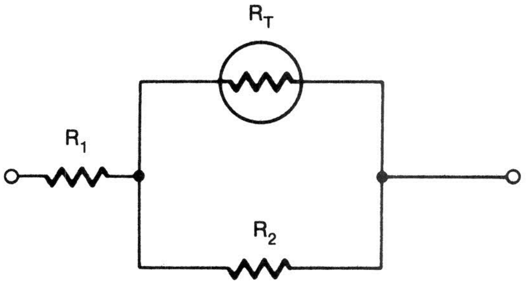


FIGURE 18C

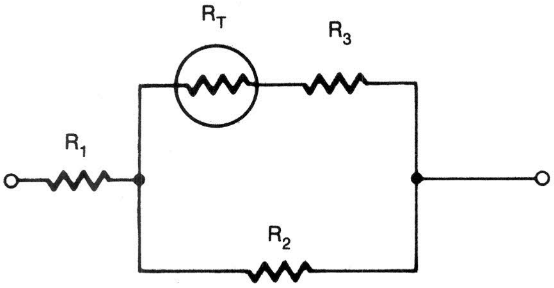
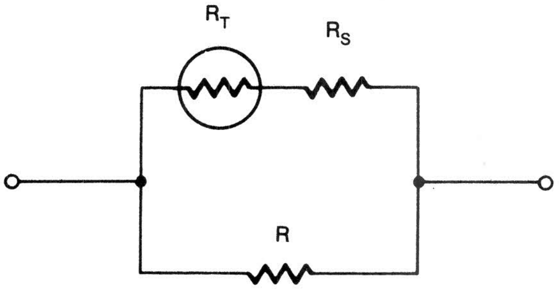


FIGURE 18D



MULTIPLE THERMISTOR NETWORKS:

There is a practical limit to obtaining linearized voltage divider or linearized resistance networks using a single thermistor. In order to obtain better linearization over wider temperature spans, two or more thermistors are sometimes used in combination with resistor networks. Figures (19) and (20) illustrate two and three thermistor networks, respectively.

The analytical solutions for these multiple thermistor networks are too complex for presentation. The usual procedure is to obtain the optimum solution by means of a computer model of the desired circuit and an iterative program. Based on the temperature range and the desired circuit characteristics a reasonably good first approximation can be made for the circuit element values. The computer will then adjust the element values incrementally and examine the results until an optimum network is achieved.

FIGURE 19A

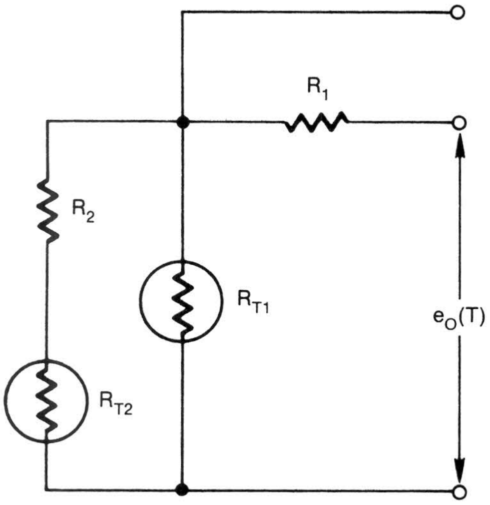


FIGURE 19B

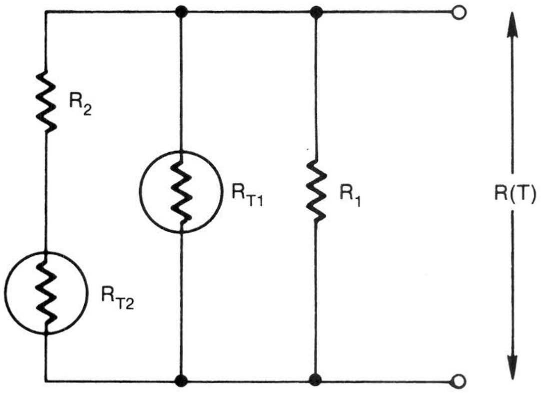


FIGURE 20A

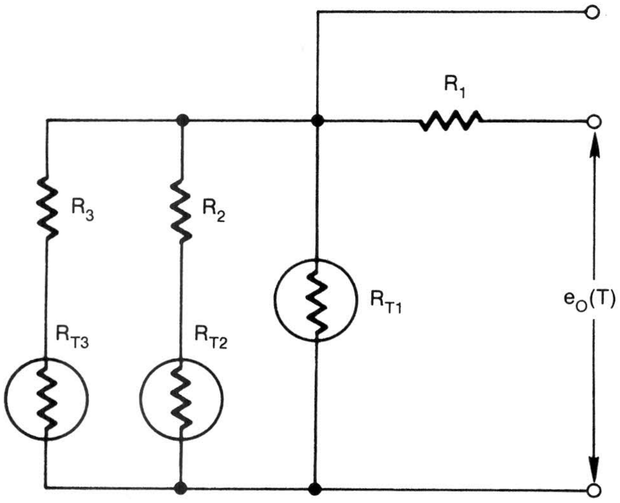
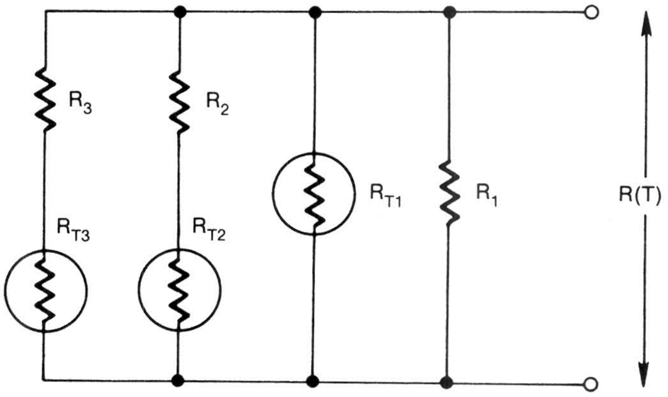


FIGURE 20B



THERMISTOR TERMINOLOGY REPRINTED FROM MIL-T-23648A

3.3 Definitions

3.3.1 *Thermistor.* A thermistor is a thermally sensitive resistor whose primary function is to exhibit a change in electrical resistance with a change in body temperature.

3.3.2 *Standard reference temperature.* The standard reference temperature is the thermistor body temperature at which nominal zero-power resistance is specified (25° C).

3.3.3 *Zero-power resistance* (R_T). The zero-power resistance is the dc resistance value of a thermistor measured at a specified temperature with a power dissipation by the thermistor low enough that any further decrease in power will result in not more than 0.1 percent (or 1/10 of the specified measurement tolerance, whichever is smaller) change in resistance.

3.3.4 *Resistance ratio characteristic.* The resistance ratio characteristic identifies the ratio of the zero-power resistance of a thermistor measured at 25° C to that resistance measured at 125° C.

3.3.5 *Zero-power temperature coefficient of resistance (alpha* α T). The Zero-power temperature coefficient of resistance is the ratio at a specified temperature (T), of the rate of change of zero-power resistance with temperature to the zero-power resistance of the thermistor.

$$\alpha_T = \frac{1}{R_T}\,\frac{(dR_T)}{(dT)}$$

3.3.5.1 *Negative temperature coefficient (NTC).* A NTC thermistor is one in which the zero-power resistance decreases with an increase in temperature.

3.3.5.2 *Positive temperature coefficient (PTC).* A PTC thermistor is one in which the zero-power resistance increases with an increase in temperature.

3.3.6 *Maximum operating temperature.* The maximum operating temperature is the maximum body temperature at which the thermistor will operate for an extended period of time with acceptable stability of its characteristics. This temperature is the result of internal or external heating, or both, and should not exceed the maximum value specified.

3.3.7 *Maximum power rating.* The maximum power rating of a thermistor is the maximum power which a thermistor will dissipate for an extended period of time with acceptable stability of its characteristics.

3.3.8 *Dissipation constant.* The dissipation constant is the ratio, (in milliwatts per degree C) at a specified ambient temperature, of a change in power dissipation in a thermistor to the resultant body temperature change.

3.3.9 *Thermal time constant.* The thermal time constant is the time required for a thermistor to change 63.2 percent of the total difference between its initial and final body temperature when subjected to a step function change in temperature under zero-power conditions.

3.3.10 *Resistance-temperature characteristic.* The resistance-temperature characteristic is the relationship between the zero-power resistance of a thermistor and its body temperature.

3.3.11 *Temperature - wattage characteristics.* The temperature-wattage characteristic of a thermistor is the relationship at a specified ambient temperature between the thermistor temperature and the applied steady-state wattage.

3.3.12 *Current-time characteristic.* The current-time characteristic is the relationship at a specified ambient temperature between the current through a thermistor and time, upon application or interruption of voltage to it.

3.3.13 *Stability.* Stability of a thermistor is the ability of a thermistor to retain specified characteristics after being subjected to designated environmental or electrical test conditions.

SPECIAL ASSEMBLY DESIGN DATA

SPECIAL ASSEMBLY DESIGN:

The assemblies and mounts shown in the Sensor Handbook represent basic constructions which are suitable for a wide variety of applications. For a more specific application, however, a custom assembly can be designed by using the listing of standard materials and specifying the appropriate dimensions and/or features. Thermometrics' Applications Engineers are ready and willing to assist the designer in materials selection and packaging.

Please note that such custom assemblies are not truly unique or different if they can be constructed from the basic materials listed in this Sensor Handbook. Most of the materials and enclosures shown in the Sensor Handbook are stocked so that assembly lead-times can be held to a minimum. When special materials or special fabrications are required, the designer should allow for additional assembly lead-time and anticipate higher costs.

In certain cases, the customer may provide special materials or components to Thermometrics Inc. for inclusion in a custom assembly. Such customer supplied materials may provide a savings in time, expense or both for special orders. Please contact our Applications Engineering department for additional information and assistance regarding materials selection and/or customer supplied materials or hardware.

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

TUBING: STAINLESS STEEL

The most versatile and useful metal tubing in the Sensor Handbook is stainless steel. Tubing is available in hypodermic gauge sizes from #6 (.203"O.D.) to #25 (.020"O.D.) in alloy T304. Standard fractional tubing (ASTM A269) and close tolerance fractional tubing (ASTM A632) is available in alloys 304 or 316 as seamless or welded stock. Other series 300 or 400 alloys, special wall sizes and metric sizes can be specified for custom assemblies. The basic sizes most commonly used in the Sensor Handbook are listed in the following table.

SIZE	O.D. (REF.)	I.D. (REF.)
#24xx	.022	.016
#22TW	.028	.020
1/32"	.0313	.0193
#21TW	.032	.022
#20TW	.0355	.0255
#19TW	.0425	.0325
#18TW	.050	.042
#17TW	.059	.046
1/16"	.0625	.0465
#16	.065	.047
#15	.072	.054
#14	.083	.063
3/32"	.0938	.0638
#13	.095	.071
#12TW	.109	.091
#11	.120	.094
1/8"	.125	.105
#10	.134	.106
#9	.148	.118
5/32"	.1563	.1243
#8	.165	.135
#7	.180	.150
3/16"	.1875	.1555
#6	.203	.173
7/32"	.2188	.1868
1/4"	.250	.210

TUBING: ALUMINUM

Aluminum tubing is available in diameters of 1/8", 3/16" and 1/4" with standard wall thicknesses from .020" to .035". The most commonly specified alloy is D6061-T6, however, other alloys may be available on special order. The basic sizes of alloy D6061-T6 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/8) .125	.085	.020
(3/16) .1875	.1435	.022
(1/4) .250	.194	.028

TUBING: BRASS

Brass tubing is available in fractional sizes of 1/16" to 1/4" diameter with the wall thickness being 1/64" or 1/32". The most commonly specified alloy is #330. Special precision tubing diameters and wall thicknesses ranging from .012" to .065" (as appropriate) may be available on special order. The basic sizes of alloy #330 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/16) .0625	.0313	.0156
(3/32) .0938	.0625	.0156
(1/8) .125	.0625	.0313
(5/32) .1563	.0938	.0313
(3/16) .1875	.125	.0313
(7/32) .2188	.1563	.0313
(1/4) .250	.1875	.0313

TUBING: OTHER METALS

Support tubings for assemblies can be specified from other alloys or metals upon special order and subject to availability. Some common tubing materials which are available for special orders are as follows:

COPPER
HASTALLOY C
INCONEL 600
MONEL 400
NICKEL 200
TITANIUM

TUBING: RIGID PLASTICS AND INSULATORS

Support tubings for assemblies can be specified from rigid plastic formulations or insulation materials that are commercially available in the form of cast or extruded tubes. Rod stock can also be selected, however, machining costs will make these selections more costly. Some common materials which are available as tube or rod stock are as follows:

ABS
ACETAL (DELRIN)
ACRYLIC
FLUOROPLASTIC — CTFE
FLUOROPLASTIC — FEP
FLUOROPLASTIC — TFE
NYLON
PHENOLIC
POLYCARBONATE (LEXAN)
POLYETHYLENE
POLYPROPYLENE
POLYSTYRENE
POLYURETHANE
PVC, RIGID
POLYVINYLIDENE FLUORIDE (KYNAR)
REINFORCED LAMINATES
CAST EPOXY
STEATITE
KRAFT PAPER

TUBING: FLEXIBLE PLASTICS, ELASTOMERS AND INSULATING SLEEVES

These materials can be used to provide electrical insulation over circuit interconnections or they may be used to provide electrical insulation and environmental protection over the thermistor and extension leads.

Sleeves may be cemented into position with adhesives or some may be heat shrunk into position as required. Protective sheaths may be open ended or they may be sealed by heat, solvents or adhesives depending upon the type of material selected.

The following are commonly used flexible plastic tubings, elastomeric tubings or insulating tubings which may be specified:

INSULATING SLEEVES:

FIBERGLASS, NATURAL
FIBERGLASS, SILICONE IMPREGNATED
KAPTON
NOMEX
POLYIMIDE

ELASTOMERS:

BUNA-N
NEOPRENE
SILICONE RUBBER
SILICONE, MEDICAL GRADE
VITON

SHRINK TUBINGS:

KYNAR
MYLAR
POLYOLEFIN
POLYOLEFIN, CROSS-LINKED
POLYOLEFIN, MELTABLE WALL
POLYVINYL CHLORIDE (PVC)
TEFLON, FEP
TEFLON, TFE
POLYETHYLENE

NON-SHRINK TUBINGS (EXTRUDED)

POLYETHYLENE, RADIOPAQUE MEDICAL
POLYETHYLENE, NON RADIOPAQUE MEDICAL
POLYVINYL CHLORIDE (PVC)
POLYURETHANE
TEFLON, FEP
TEFLON, TFE
TYGON
VINYL, MEDICAL GRADE

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT

CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

COATINGS:

Various coatings can be provided for additional protection against the effects of moisture, solvents or chemicals. Lacquers, varnishes, liquid epoxy resins, polyurethanes, vinyls and silicones are commonly used for dip coatings or sprayed finishes on various special assemblies.

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

THREADS:

Threaded bodies for surface mount assemblies and threaded hubs for immersion assemblies are available in all standard sizes and classifications.

The Sensor Handbook shows the most common threaded bodies and hubs in the options listing for each assembly type. Other threads and thread lengths may be specified for custom assemblies except that thread diameters and pitches will be governed by industry standards. A partial listing of thread types which are available for thermistor assemblies is as follows:

NEF/UNEF	NPT
12 -32	1/16 -27
1/4 - 32	1/8 - 27
5/16 - 32	1/4 - 18
3/8 - 32	3/8 - 18
7/16 - 28	1/2 - 14
1/2 - 28	

NC/UNC	NF/UNF
4 - 40	4 - 48
5 - 40	5 - 44
6 - 32	6 - 40
8 - 32	8 - 36
10 - 24	10 - 32
12 - 24	12 - 28
1/4 - 20	1/4 - 28
5/16 - 18	5/16 - 24
3/8 - 16	3/8 - 24
7/16 - 14	7/16 - 20
1/2 - 12	1/2 - 20

EXTENSION LEADS:

Extension leads are available in many conductor alloys, gauge sizes, insulations and constructions. Obviously, not all combinations are readily available and not all combinations are suitable for certain assemblies. The physical dimensions, electrical characteristics and thermal properties of an extension lead or cable must be given appropriate consideration in any special design problem.

The wires and cables which are listed in this Sensor Handbook represent the most commonly available extension leads. Most are stocked at Thermometrics Inc. to expedite delivery on assemblies, whether the assembly is a standard design or a custom design. Other wires and cables may be specified if desired, assuming that they can be manufactured, however, there will be a minimum purchase requirement for such special wires and cables. This can be quite costly in many cases and should only be considered when the quantity of assemblies to be manufactured is reasonably large.

EXTENSION LEADS: MAGNET WIRE

Magnet wires are small gauge, unplated, solid conductors with thin insulation coatings. Their small size makes them ideally suited for small bead or small probe thermistor assemblies. The Sensor Handbook has the commonly available magnet wire selections listed in the options for such small bead or small probe assemblies.

The listing below gives some typical materials and constructions for magnet wires. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES: #32 to #44 (SOLID)

CONSTRUCTION:
- SINGLE CONDUCTOR
- BIFILAR (TWO PARALLEL CONDUCTORS)
- TWISTED PAIR
- MULTIFILAR

ALLOYS:
- NICKEL 200
- NICKEL 270
- COPPER
- ALLOY 180
- PLATINUM
- SS 304

INSULATIONS:
- HEAVY ISOMID
- POLYURETHANE
- POLYURETHANE/NYLON
- TEFLON
- ENAMEL
- POLYIMIDE

EXTENSION LEADS: FLAT TWIN LEAD, RIBBON CABLE

Flat twin lead or ribbon cables are larger gauge sizes than the magnet wires and are usually stranded conductors with heavier wall insulations. They are used on medium to large size assemblies. The options listing for such assemblies in the Sensor Handbook will give the commonly available flat twin lead or ribbon cable selections.

The following listing gives some typical materials and constructions for these cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
- FLAT TWIN #18 - #24
- RIBBON #28 - #32

CONSTRUCTION:
- SOLID
- STRANDED

ALLOYS:
- BARE COPPER
- TINNED COPPER
- SILVER PLATED COPPER

INSULATIONS:
- TEFLON - TFE
- PVC

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
18
20
22
24
26
28
30
32

CONSTRUCTION:
SOLID
STRANDED

ALLOYS:
BARE COPPER
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
OFHC COPPER
NICKEL
DUMET

INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
SILICONE RUBBER
POLYIMIDE
FIBERGLASS
POLYETHYLENE
POLYALKENE
FLUOROCARBON/POLYIMIDE
KYNAR
TEFZEL

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
20
22
24
26
28
30
32

CONSTRUCTION:
RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:
BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

TERMINATIONS:

The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

ASSEMBLIES & ORDERING INFORMATION

STANDARD ASSEMBLIES:

The tables on the following pages of the Sensor Handbook show the most commonly used protective housings and mounts which are suitable for a wide variety of temperature measurement and control applications. Each type of sensor assembly has a basic description of style and application as well as an outline drawing and a table of standard configurations. The tinted portion of the table lists the normal options which the customer may specify for each type of sensor assembly.

When specifying a customized sensor assembly, please refer to the previous listings in the section on Special Assembly Design. These listings will contain the most commonly available materials and dimensions. Other materials and dimensions may be available upon special order. Please consult the factory for availability.

The recommended thermistor which is listed for each standard configuration shown in the following tables represents the largest thermistor (or pair of thermistors) which will fit suitably into the housing or enclosure. Any smaller thermistors will fit; however, there will be practical limitations based on the relative size of the thermistor and the housing or enclosure.

DIMENSIONS AND TOLERANCES:

Unless otherwise specified, all dimensions shown in the following drawings or tables are expressed in inches.

Tolerances on dimensions will vary from one assembly type to another depending upon the nature of the materials used and relative sizes. For applications where tolerances are critical, please consult the factory for exact specifications.

As a general guide, the following basic tolerances may be used except where otherwise noted or where industry standards are applicable. (Example: pipe threads).

a) one place decimals	± .03"
b) two place decimals	± .01"
c) three place decimals	± .005"
d) fractional (under 1")	± 1/64"
e) fractional (under 3")	± 1/32"
f) fractional (under 6")	± 1/16"
g) fractional (under 12")	± 1/8"
h) extension leads, extension cables and armored sheaths — dimension given is minimum.	

ORDERING INFORMATION:

The Sensor Handbook is intended to be used with the Thermometrics, Inc. Thermistor Catalog in order to specify an assembly which will measure or control a temperature related parameter of almost any substance or process.

The complete electrical and mechanical specifications for the thermistor component are listed in the Thermistor Catalog. The dimensions and design information for various types of enclosures or housings are categorized in the Sensor Handbook.

A complete Sensor Assembly part number would consist of the assembly prefix number from the appropriate table in the Sensor Handbook and the appropriate part number from the Thermistor Catalog.

Example: T0104/B1-BR16KA103M

This assembly consists of a ruggedized bead thermistor, .016" nominal diameter, 10K ohms ± 20% at 25° C, (see pages B10 and B11 of Thermistor Catalog) which is welded to 38 Ga., Nickel Alloy 200, heavy isomid insulated extension leads and epoxied into a polyimide sleeve, maximum diameter of .022". (See pages 34 and 35 of Sensor Handbook for details.)

ABBREVIATIONS:

INSULATING/ENCAPSULATING MATERIALS:

CTFE	Chlorotrifluoroethylene
FEP	Fluorinated Ethylene Propylene
PE	Polyethylene
POLY	Polyurethane
PVC	Polyvinylchloride
RTV	Room Temperature Vulcanizing Silicone
SIL	Silicone Rubber
TFE	Polytetrafluoroethylene

METALS AND FINISHES:

ALUM	Aluminum
ALUM & AU	Aluminum with gold iridite finish
AU	Gold
AU/KOVAR	Gold plated Kovar
BeCu	Beryllium Copper
ETP	Electro-Tin Plated Copper
Ni/KOVAR	Nickel plated Kovar
NP PH.BRZ	Nickel plated Phosphor Bronze
NP STEEL	Nickel plated Steel
SN STEEL	Hot tin dipped Steel
SS	Stainless Steel (304 typical)
TW SS	Thin wall stainless steel tubing
XXSS	Special thin wall stainless steel tubing

CONDUCTOR ALLOYS:

BC	Bare Copper
BCW	Bare Copperweld
Ni	Nickel
Ni200	Nickel Alloy 200
Ni270	Nickel Alloy 270
NPC	Nickel Plated Copper
OFHC	Oxygen Free High Conductivity Copper
SCCW	Silver Coated Copperweld
SPC	Silver Plated Copper
TC	Tinned Copper

THERMISTOR TYPES:

B	Bead thermistor
BR	Ruggedized Bead thermistor
CTP	Cryogenic Probe thermistor
DC	Interchangeable, Epoxy Coated Chip thermistor
FP	Fastip Probe thermistor
HTP	High Temperature Probe thermistor
MC	Biomedical Chip thermistor
P	Probe thermistor
SP	Ultrastable Probe thermistor

SERIES T0100

STYLE: A series T0100 assembly consists of a bead or chip thermistor attached to small diameter extension leads and encapsulated into an insulating sleeve. The extension leads are bifilar magnet wire or twin conductor ribbon cable. The thermistor may be completely encapsulated for maximum strain relief or may be partially exposed for fast response.

APPLICATION: The series T0100 assemblies are suitable for applications where small size and fast response are important. They may be used as is or they may be further encapsulated into small housings or enclosures. These assemblies may be suitable for direct immersion in conductive fluids, see pages 184 to 187.

FIGURE 1

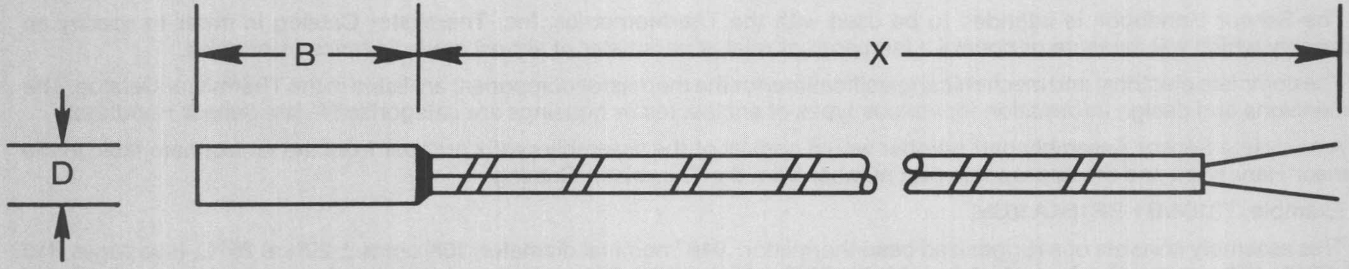
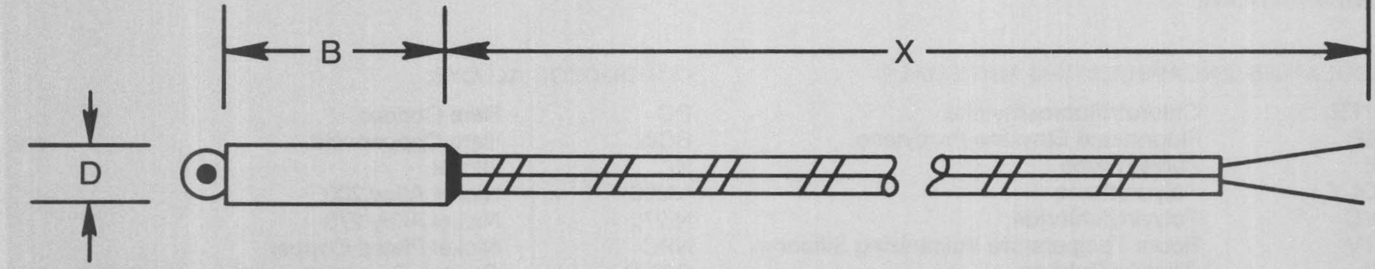


FIGURE 2



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ASSEMBLY PREFIX	FIG.	INSULATING SLEEVE DIA. "D"	LENGTH "B"	MATERIAL	EXTENSION LEADS LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
T0101/A1	1	.016	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	B05, B07
T0101/B1	1	.016	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B05, B07
T0102/A1	1	.018	.100	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	B10, BR11
T0102/B1	1	.018	.100	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B10, BR11
T0103/A1	1	.021	.100	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	B14, BR14
T0103/B1	1	.021	.100	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B14, BR14
T0104/A1	1	.022	.100	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR16
T0104/B1	1	.022	.100	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR16
T0105/A1	1	.032	.100	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR23
T0105/B1	1	.032	.100	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR23
T0106/A1	1	.040	.125	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR32
T0106/B1	1	.040	.125	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32
T0107/A1	1	.050	.125	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B35
T0107/B1	1	.050	.125	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	B35
T0108/A1	1	.053	.125	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR42
T0108/B1	1	.053	.125	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	BR42
T0109/A1	1	.056	.125	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B43
T0109/B1	1	.056	.125	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	B43
T0110/A1	1	.070	.150	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR55
T0110/B1	1	.070	.150	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	BR55
T0111/A1	2	.014	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	B05, B07
T0111/B1	2	.014	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B10, BR11
T0112/A1	2	.016	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	B14, BR14
T0112/B1	2	.016	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B14, BR14
T0113/A1	2	.017	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR16
T0113/B1	2	.017	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR16
T0114/A1	2	.025	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR23
T0114/B1	2	.025	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR23
T0115/A1	2	.033	.080	ML POLYIMIDE	72	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR32
T0115/B1	2	.033	.080	ML POLYIMIDE	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32
T0116/A1	2	.042	.100	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B35
T0116/B1	2	.042	.100	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	B35
T0117/A1	2	.046	.100	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR42
T0117/B1	2	.046	.100	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	BR42
T0118/A1	2	.050	.100	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	B43
T0118/B1	2	.050	.100	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	B43
T0119/A1	2	.060	.100	KAPTON	72	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR55
T0119/B1	2	.060	.100	KAPTON	72	36	BC	HEAVY ISOMID	EPOXY	175	BR55
T0120/A1	1	.070	.250	KAPTON	18	32	BC	HEAVY ISOMID	EPOXY	105	MC50
T0120/B1	1	.070	.250	KAPTON	18	32	BC	POLY/NYLON	EPOXY	105	MC50
T0120/C1	1	.070	.250	KAPTON	18	32	TC	PVC	EPOXY	105	MC50
T0120/D1	1	.070	.250	KAPTON	18	30	TC	PVC	EPOXY	105	MC50
T0120/E1	1	.070	.250	KAPTON	18	32	SPC	TFE	EPOXY	105	MC50
T0120/F1	1	.070	.250	KAPTON	18	30	SPC	TFE	EPOXY	105	MC50
T0100		a/r	a/r	ML POLYIMIDE	a/r	32	TC	PVC	EPOXY	60	B05
SERIES				KAPTON		30	TC	PVC		105	B07
OPTIONS				MYLAR					RTV	125	B10
				PVC		32	SPC	TFE		175	B14
				POLYETHYLENE		30	SPC	TFE		200	B35
				TEFLON (TFE)						260	B43
				TEFLON (FEP)		36	BC	HEAVY ISOMID			
				KYNAR		34	BC	HEAVY ISOMID			BR11
						32	BC	HEAVY ISOMID			BR14
											BR16
						40	Ni 200	HEAVY ISOMID			BR23
						38	Ni 200	HEAVY ISOMID			BR32
											BR42
						40	Ni 270	HEAVY ISOMID			BR55
						38	Ni 270	HEAVY ISOMID			
											MC50
						32	BC	POLY/NYLON			

SERIES T0200

STYLE: A series T0200 assembly consists of a miniature thermistor probe attached to small diameter extension leads and encapsulated into an insulating sleeve. The extension leads are bifilar magnet wire or twin conductor ribbon cable. The probe may be fully encapsulated for maximum strain relief or may be partially exposed for fast response.

APPLICATION: The series T0200 assemblies are suitable for applications where small size and fast response are important. The assemblies may be used as is or they may be further encapsulated into small housings or enclosures. The longer glass seal of the miniature probes offers an advantage in the exposed tip assemblies over small bead assemblies in that a better moisture seal may be accomplished. Thus, the series T0200 assemblies are suitable for limited immersion in conductive fluids when further assembly has been performed.

FIGURE 1

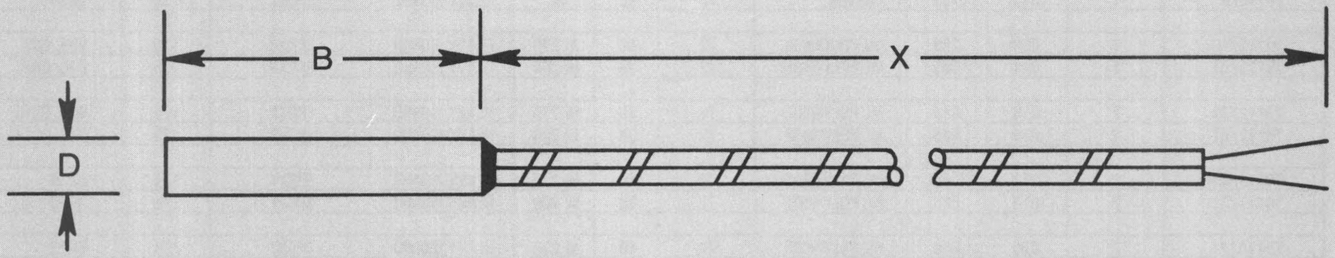
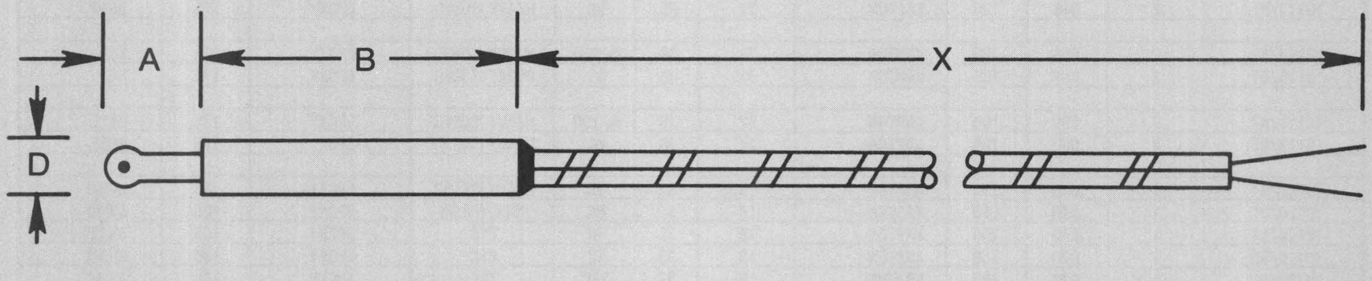


FIGURE 2



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ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	INSULATING SLEEVE			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T0201/A1	1	—	.026	.187	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20AA
T0201/A2	1	—	.026	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20A
T0201/A3	1	—	.026	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20B
T0201/B1	1	—	.026	.187	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20AA
T0201/B2	1	—	.026	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20A
T0201/B3	1	—	.026	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20B
T0202/A1	1	—	.031	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P25A
T0202/A2	1	—	.031	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P25B
T0202/B1	1	—	.031	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P25A
T0202/B2	1	—	.031	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P25B
T0203/A1	1	—	.036	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P30A
T0203/A2	1	—	.036	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P30B
T0203/B1	1	—	.036	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P30A
T0203/B2	1	—	.036	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P30B
T0204/A1	2	.030	.020	.187	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20AA
T0204/A2	2	.045	.020	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20A
T0204/A3	2	.060	.020	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P20B
T0204/B1	2	.030	.020	.187	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20AA
T0204/B2	2	.045	.020	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20A
T0204/B3	2	.060	.020	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P20B
T0205/A1	2	.045	.025	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P25A
T0205/A2	2	.060	.025	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P25B
T0205/B1	2	.045	.025	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P25A
T0205/B2	2	.060	.025	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P25B
T0206/A1	2	.045	.030	.250	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P30A
T0206/A2	2	.060	.030	.375	ML POLYIMIDE	72	40	Ni270	HEAVY ISOMID	EPOXY	175	P30B
T0206/B1	2	.045	.030	.250	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P30A
T0206/B2	2	.060	.030	.375	ML POLYIMIDE	72	38	Ni200	HEAVY ISOMID	EPOXY	175	P30B
T0200												
SERIES		a/r	a/r	a/r	ML POLYIMIDE	a/r	32	TC	PVC	EPOXY	60	P20
OPTIONS					KAPTON		30	TC	PVC		105	P25
					MYLAR					RTV	125	P30
					PVC		32	SPC	TFE		175	
					POLYETHYLENE		30	SPC	TFE		200	
					TEFLON (TFE)						260	
					TEFLON (FEP)		36	BC	HEAVY ISOMID			
					KYNAR		34	BC	HEAVY ISOMID			
							32	BC	HEAVY ISOMID			
							40	Ni200	HEAVY ISOMID			
							38	Ni200	HEAVY ISOMID			
							40	Ni270	HEAVY ISOMID			
							38	Ni270	HEAVY ISOMID			
							32	BC	POLY/NYLON			

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

COATINGS:

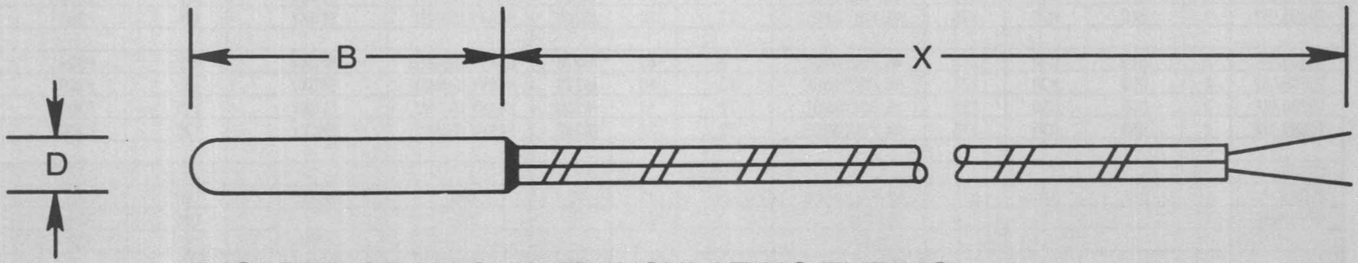
Various coatings can be provided for additional protection against the effects of moisture, solvents or chemicals. Lacquers, varnishes, liquid epoxy resins, polyurethanes, vinyls and silicones are commonly used for dip coatings or sprayed finishes on various special assemblies.

SERIES TO300

STYLE: A series T0300 assembly consists of a bead or chip thermistor attached to small diameter extension leads and encapsulated into a closed end insulation tubing. The insulation tubing may be machined or molded with a closed end or may be heat sealed closed. The extension leads are bifilar magnet wire or twin conductor ribbon cable.

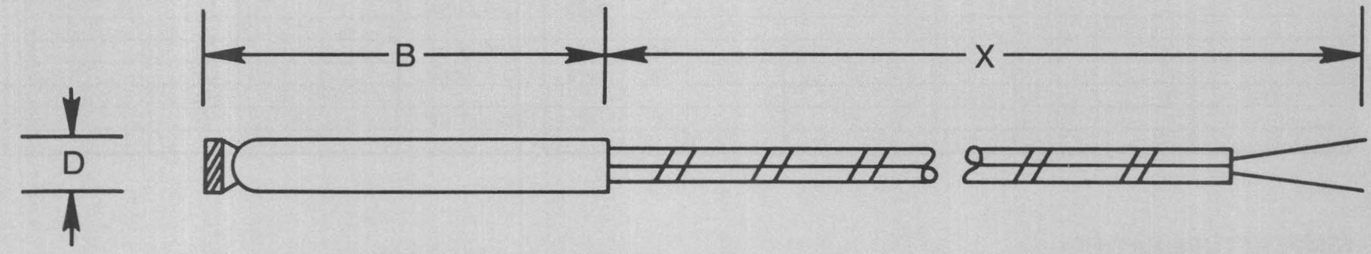
APPLICATION: The series T0300 assemblies are suitable for applications where limited immersion in conductive or corrosive fluids are involved. The assemblies are not fully immersible over the back of the insulation tubing in such fluids. The small size of the assemblies permits them to be used in applications where fast response as well as protection from harsh environments is required.

FIGURE 1



(MOLDED OR MACHINED INSULATING TUBING)

FIGURE 2



(HEAT SEALED THERMOPLASTIC SLEEVE)

THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

		INSULATING SLEEVE			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
T0301/A1	1	.070	5/16	PVC	24	32	BC	HEAVY ISOMID	EPOXY	80	MC50
T0301/B1	1	.070	5/16	PVC	24	32	BC	POLY/NYLON	EPOXY	80	MC50
T0301/C1	1	.070	5/16	PVC	24	30	TC	PVC	EPOXY	80	MC50
T0301/D1	1	.070	5/16	PVC	24	30	SPC	TFE	EPOXY	80	MC50
T0302/A1	1	.070	5/16	DELRIN	24	32	BC	HEAVY ISOMID	EPOXY	80	MC50
T0302/B1	1	.070	5/16	DELRIN	24	32	BC	POLY/NYLON	EPOXY	80	MC50
T0302/C1	1	.070	5/16	DELRIN	24	30	TC	PVC	EPOXY	80	MC50
T0302/D1	1	.070	5/16	DELRIN	24	30	SPC	TFE	EPOXY	80	MC50
T0303/A1	2	.037	1-1/2	MYLAR	72	40	Ni 270	HEAVY ISOMID	EPOXY	125	BR16
T0303/B1	2	.037	1-1/2	MYLAR	72	38	Ni 200	HEAVY ISOMID	EPOXY	125	BR16
T0304/A1	2	.045	1-1/2	MYLAR	72	40	Ni 270	HEAVY ISOMID	EPOXY	125	BR23
T0304/B1	2	.045	1-1/2	MYLAR	72	38	Ni 200	HEAVY ISOMID	EPOXY	125	BR23
T0305/A1	2	.053	1-1/2	MYLAR	72	40	Ni 270	HEAVY ISOMID	EPOXY	125	BR32
T0305/B1	2	.053	1-1/2	MYLAR	72	38	Ni 200	HEAVY ISOMID	EPOXY	125	BR32
T0306/A1	2	.066	1-1/2	MYLAR	72	40	Ni 270	HEAVY ISOMID	EPOXY	125	BR42
T0306/B1	2	.066	1-1/2	MYLAR	72	38	Ni 200	HEAVY ISOMID	EPOXY	125	BR42
T0307/A1	2	.080	1/1-2	MYLAR	72	40	Ni 270	HEAVY ISOMID	EPOXY	125	BR55
T0307/B1	2	.080	1-1/2	MYLAR	72	38	Ni 200	HEAVY ISOMID	EPOXY	125	BR55
											BR14
T0300											BR16
SERIES		a/r	a/r	MYLAR	a/r	32	TC	PVC	EPOXY	60	BR23
OPTIONS				POLYETHYLENE		30	TC	PVC		80	BR32
				PVC						105	BR42
				DELRIN		32	SPC	TFE		125	BR55
						30	SPC	TFE			
									RTV		MC50
						40	Ni 200	HEAVY ISOMID			
						38	Ni 200	HEAVY ISOMID			
						40	Ni 270	HEAVY ISOMID			
						38	Ni 270	HEAVY ISOMID			
						36	BC	HEAVY ISOMID			
						34	BC	HEAVY ISOMID			
						32	BC	HEAVY ISOMID			
						32	BC	POLY/NYLON			

EXTENSION LEADS: MAGNET WIRE

Magnet wires are small gauge, unplated, solid conductors with thin insulation coatings. Their small size makes them ideally suited for small bead or small probe thermistor assemblies. The Sensor Handbook has the commonly available magnet wire selections listed in the options for such small bead or small probe assemblies.

The listing below gives some typical materials and constructions for magnet wires. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	#32 to #44 (SOLID)
CONSTRUCTION:	SINGLE CONDUCTOR BIFILAR (TWO PARALLEL CONDUCTORS) TWISTED PAIR MULTIFILAR
ALLOYS:	NICKEL 200 NICKEL 270 COPPER ALLOY 180 PLATINUM SS 304
INSULATIONS:	HEAVY ISOMID POLYURETHANE POLYURETHANE/NYLON TEFLON ENAMEL POLYIMIDE

SERIES T0400

STYLE: A series T0400 assembly consists of a large bead or chip thermistor attached to insulated hook up wire and encapsulated into an insulating sleeve. The extension leads range from 18 to 32 gauge in various alloys and with various insulation materials.

APPLICATION: The series T0400 assemblies are suitable for use in all general temperature measurement, compensation or control applications. The assemblies may be used as is or they may be further assembled into housings or enclosures. The thermistor may be fully encapsulated or partially exposed at the tip of the insulating sleeve for better response times. The assemblies are not recommended for use in conductive or corrosive fluids without some modifications. Please consult factory for additional information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1

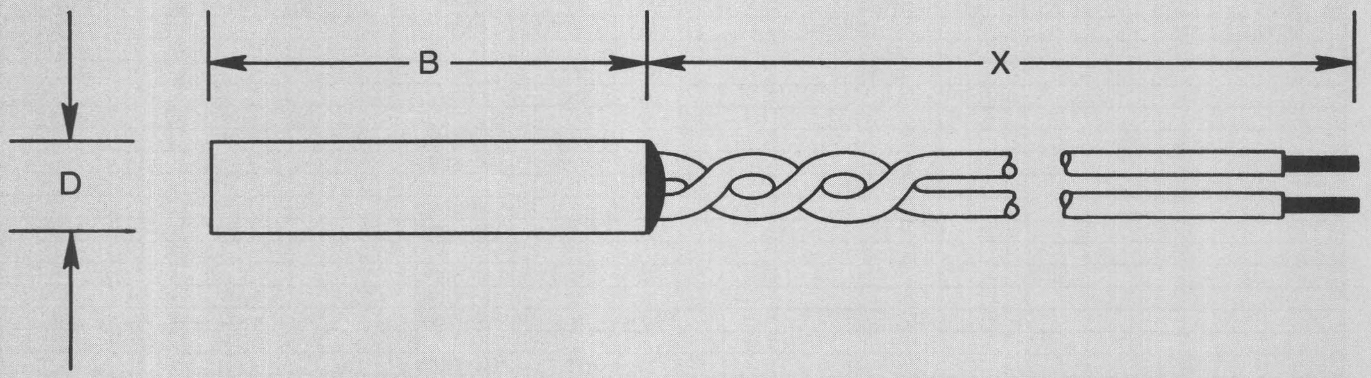
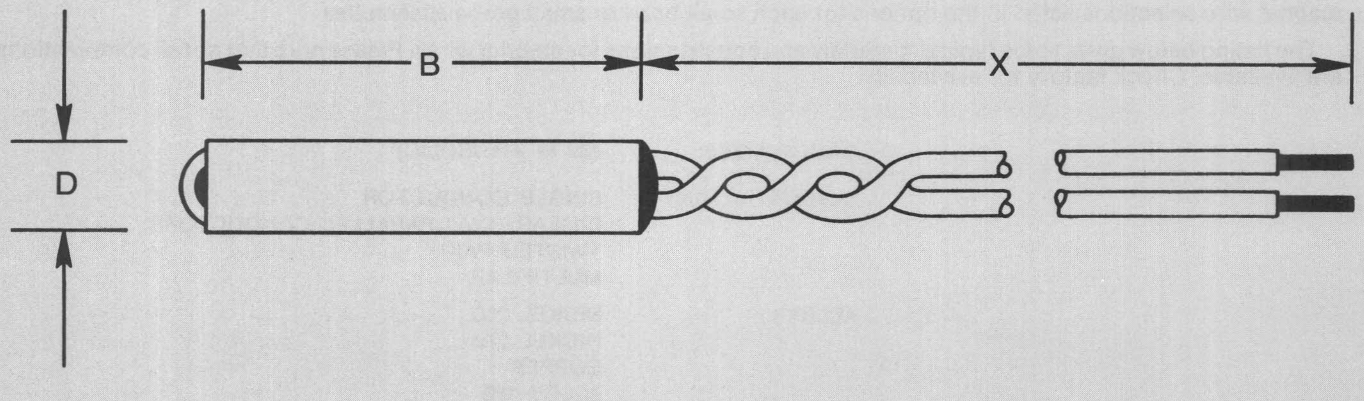


FIGURE 2



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ASSEMBLY PREFIX	FIG.	INSULATING SLEEVE DIA. "D"	LENGTH "B"	MATERIAL	EXTENSION LEADS LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
T0401/A1	1	.090	1/2	KAPTON	48	32	TC	PVC	EPOXY	105	BR32
T0401/B1	1	.090	1/2	KAPTON	48	32	SPC	TFE	EPOXY	200	BR32
T0402/A1	1	.100	5/8	KAPTON	48	28	TC	PVC	EPOXY	105	BR42, MC50
T0402/B1	1	.100	5/8	KAPTON	48	28	SPC	TFE	EPOXY	200	BR42
T0403/A1	1	.120	3/4	KAPTON	48	26	TC	PVC	EPOXY	105	BR55, MC50
T0403/B1	1	.120	3/4	KAPTON	48	26	SPC	TFE	EPOXY	200	BR55
T0404/A1	1	.125	1	PVC	48	28	TC	PVC	EPOXY	105	BR32, 42, 55
T0404/B1	1	.125	1	PVC	48	28	SPC	TFE	EPOXY	105	BR32, 42, 55
T0405/A1	1	.140	1-1/4	PVC	48	26	TC	PVC	EPOXY	105	BR32, 42, 55
T0405/B1	1	.140	1-1/4	PVC	48	26	SPC	TFE	EPOXY	105	BR32, 42, 55
T0406/A1	1	.187	1-1/4	STEATITE	48	22	NPC	TFE	EPOXY	260	BR55
T0406/B1	1	.187	1-1/4	STEATITE	48	22	Ni	FIBERGLASS	CERAMIC	300	BR55
T0407/A1	1	.250	1-1/2	EPOXY	48	22	TC	PVC	EPOXY	105	BR55, MC50
T0407/B1	1	.250	1-1/2	EPOXY	48	22	SPC	TFE	EPOXY	150	BR55
							BC				
T0400				(FLEXIBLE)			OFHC		EPOXY	60	B35
SERIES		a/r	a/r	MYLAR	a/r	18	TC	PVC	RTV	80	B43
OPTIONS				PVC		20	SPC	TEFLON (FEP)	CERAMIC	105	BR32
				TEFLON (FEP)		22	NPC	TEFLON (TFE)		125	BR42
				TEFLON (TFE)		24	Ni	KYNAR		175	BR55
				FIBERGLASS		26		FIBERGLASS/SIL.		200	
				POLYETHYLENE		28		SILICON RUBBER		260	MC50
				KYNAR		30		KAPTON		300	DC95
				POLYOLEFIN		32		POLYETHYLENE			
				RUBBER							
				NEOPRENE							
				POLYURETHANE							
				TYGON							
				SILASTIC							
				KAPTON							
				(RIGID)							
				DELRIN							
				LEXAN							
				EPOXY							
				NYLON							
				ACRYLIC							
				PHENOLIC							
				STEATITE							

TUBING: FLEXIBLE PLASTICS, ELASTOMERS AND INSULATING SLEEVES

These materials can be used to provide electrical insulation over circuit interconnections or they may be used to provide electrical insulation and environmental protection over the thermistor and extension leads.

Sleeves may be cemented into position with adhesives or some may be heat shrunk into position as required. Protective sheaths may be open ended or they may be sealed by heat, solvents or adhesives depending upon the type of material selected.

The following are commonly used flexible plastic tubings, elastomeric tubings or insulating tubings which may be specified:

INSULATING SLEEVES:

FIBERGLASS, NATURAL
FIBERGLASS, SILICONE IMPREGNATED
KAPTON
NOMEX
POLYIMIDE

SHRINK TUBINGS:

KYNAR
MYLAR
POLYOLEFIN
POLYOLEFIN, CROSS-LINKED
POLYOLEFIN, MELTABLE WALL
POLYVINYL CHLORIDE (PVC)
TEFLON, FEP
TEFLON, TFE
POLYETHYLENE

NON-SHRINK TUBINGS (EXTRUDED):

POLYETHYLENE, RADIOPAQUE MEDICAL
POLYETHYLENE, NON RADIOPAQUE MEDICAL
POLYVINYL CHLORIDE (PVC)
POLYURETHANE
TEFLON, FEP
TEFLON, TFE
TYGON
VINYL, MEDICAL GRADE

ELASTOMERS:

BUNA-N
NEOPRENE
SILICONE RUBBER
SILICONE, MEDICAL GRADE
VITON

SERIES T0500

STYLE: A series T0500 assembly consists of a large probe thermistor attached to insulated hook up wire and encapsulated into an insulating sleeve. The extension leads range from 18 to 32 gauge in various alloys and with various insulation materials. The insulating sleeve may be flexible or rigid thermoplastic or other non-conductive material.

APPLICATION: The series T0500 assemblies are suitable for use in all general temperature measurement, compensation or control applications. The assemblies may be used as is or they may be further assembled into housings or enclosures. The thermistor may be fully encapsulated or partially exposed at the tip of the insulating sleeve. The long glass seal of the probe thermistors is an advantage in the exposed tip assemblies in that a good moisture seal can be accomplished when further assembly work is performed. The series T0500 assemblies are better suited for liquid immersion applications than thermistor bead or chip assemblies when conductive or corrosive fluids are encountered. Please consult the factory for additional information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1

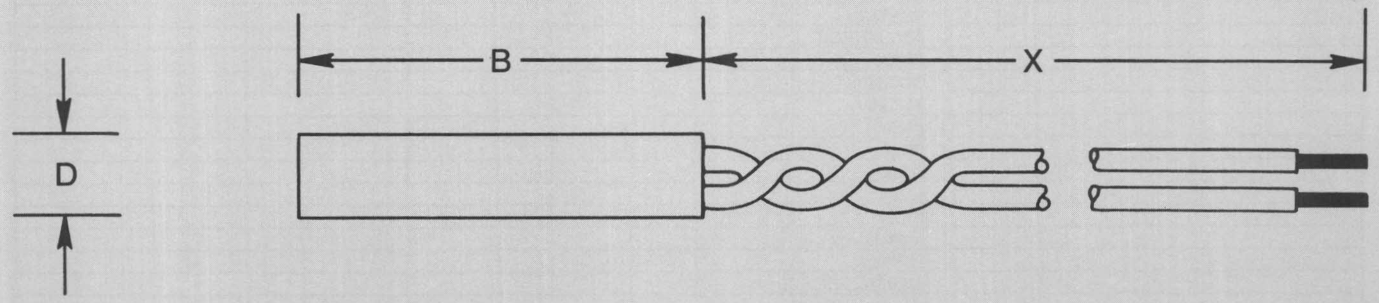
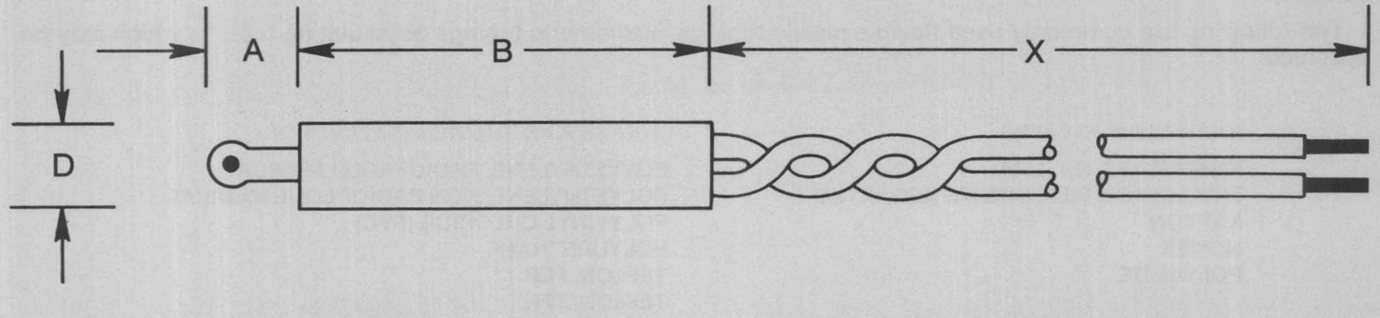


FIGURE 2



THERMOMETRICS INC.

		TIP	INSULATING SLEEVE			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T0501/A1	1	0	.080	1	KAPTON	36	32	TC	PVC	EPOXY	105	P60B
T0501/A2	2	1/16	.080	1	KAPTON	36	32	TC	PVC	EPOXY	105	P60B
T0501/A3	2	1/8	.080	1-1/4	KAPTON	36	32	TC	PVC	EPOXY	105	P60D
T0501/B1	1	0	.080	1	KAPTON	36	32	SPC	TFE	EPOXY	200	P60B
T0501/B2	2	1/16	.080	1	KAPTON	36	32	SPC	TFE	EPOXY	200	P60B
T0501/B3	2	1/8	.080	1-1/4	KAPTON	36	32	SPC	TFE	EPOXY	200	P60D
T0502/A1	1	0	.090	1	KAPTON	36	28	TC	PVC	EPOXY	105	P65B
T0502/A2	2	1/16	.090	1	KAPTON	36	28	TC	PVC	EPOXY	105	P65B
T0502/A3	2	1/8	.090	1-1/4	KAPTON	36	28	TC	PVC	EPOXY	105	P65D
T0502/B1	1	0	.090	1	KAPTON	36	28	SPC	TFE	EPOXY	200	P65B
T0502/B2	2	1/16	.090	1	KAPTON	36	28	SPC	TFE	EPOXY	200	P65B
T0502/B3	2	1/8	.090	1-1/4	KAPTON	36	28	SPC	TFE	EPOXY	200	P65D
T0503/A1	1	0	.100	1	KAPTON	36	26	TC	PVC	EPOXY	105	P85B
T0503/A2	2	1/8	.100	1-1/4	KAPTON	36	26	TC	PVC	EPOXY	105	P85B
T0503/A3	2	1/4	.100	1-1/2	KAPTON	36	26	TC	PVC	EPOXY	105	P85D
T0503/B1	1	0	.100	1	KAPTON	36	26	SPC	TFE	EPOXY	200	P85B
T0503/B2	2	1/8	.100	1-1/4	KAPTON	36	26	SPC	TFE	EPOXY	200	P85B
T0503/B3	2	1/4	.100	1-1/2	KAPTON	36	26	SPC	TFE	EPOXY	200	P85D
T0504/A1	1	0	.110	1	KAPTON	36	24	TC	PVC	EPOXY	105	P100B
T0504/A2	2	1/8	.110	1-1/4	KAPTON	36	24	TC	PVC	EPOXY	105	P100B
T0504/A3	2	1/4	.110	1-1/2	KAPTON	36	24	TC	PVC	EPOXY	105	P100D
T0504/B1	1	0	.110	1	KAPTON	36	24	SPC	TFE	EPOXY	200	P100B
T0504/B2	2	1/8	.110	1-1/4	KAPTON	36	24	SPC	TFE	EPOXY	200	P100B
T0504/B3	2	1/4	.110	1-1/2	KAPTON	36	24	SPC	TFE	EPOXY	200	P100D
T0505/A1	1	0	.125	1	PVC	36	32	TC	PVC	EPOXY	105	P60, P65B
T0505/A2	2	1/8	.125	1-1/4	PVC	36	32	TC	PVC	EPOXY	105	P60, P65B
T0505/A3	2	1/4	.125	1-1/2	PVC	36	32	TC	PVC	EPOXY	105	P60, P65D
T0506/A1	1	0	.140	1	PVC	36	28	TC	PVC	EPOXY	105	P85, P100B
T0506/A2	2	1/8	.140	1-1/4	PVC	36	28	TC	PVC	EPOXY	105	P85, P100B
T0506/A3	2	1/4	.140	1-1/2	PVC	36	28	TC	PVC	EPOXY	105	P85, P100D
T0507/A1	1	0	.125	1	TEFLON	36	32	SPC	TFE	EPOXY	200	P60, P65B
T0507/A2	2	1/8	.125	1-1/4	TEFLON	36	32	SPC	TFE	EPOXY	200	P60, P65B
T0507/A3	2	1/4	.125	1-1/2	TEFLON	36	32	SPC	TFE	EPOXY	200	P60, P65D
T0508/A1	1	0	.140	1	TEFLON	36	28	SPC	TFE	EPOXY	200	P85, P100B
T0508/A2	2	1/8	.140	1-1/4	TEFLON	36	28	SPC	TFE	EPOXY	200	P85, P100B
T0508/A3	2	1/4	.140	1-1/2	TEFLON	36	28	SPC	TFE	EPOXY	200	P85, P100D
T0509/A1	1	0	.125	1	KYNAR	36	32	TC	PVC	EPOXY	105	P60, P65B
T0509/A2	2	1/8	.125	1-1/4	KYNAR	36	32	TC	PVC	EPOXY	105	P60, P65B
T0509/A3	2	1/4	.125	1-1/2	KYNAR	36	32	TC	PVC	EPOXY	105	P60, P65D
T0509/B1	1	0	.125	1	KYNAR	36	32	SPC	TFE	EPOXY	175	P60, P65B
T0509/B2	2	1/8	.125	1-1/4	KYNAR	36	32	SPC	TFE	EPOXY	175	P60, P65B
T0509/B3	2	1/4	.125	1-1/2	KYNAR	36	32	SPC	TFE	EPOXY	175	P60, P65D
T0510/A1	1	0	.150	1	KYNAR	36	28	TC	PVC	EPOXY	105	P85, P100B
T0510/A2	2	1/8	.150	1-1/4	KYNAR	36	28	TC	PVC	EPOXY	105	P85, P100B
T0510/A3	2	1/4	.150	1-1/2	KYNAR	36	28	TC	PVC	EPOXY	105	P85, P100D
T0510/B1	1	0	.150	1	KYNAR	36	28	SPC	TFE	EPOXY	175	P85, P100B
T0510/B2	2	1/8	.150	1-1/4	KYNAR	36	28	SPC	TFE	EPOXY	175	P85, P100B
T0510/B3	2	1/4	.150	1-1/2	KYNAR	36	28	SPC	TFE	EPOXY	175	P85, P100D
T0511/A1	1	0	.187	1-1/4	EPOXY	36	26	TC	PVC	EPOXY & RTV	105	P60, P65B
T0511/A2	2	1/8	.187	1-1/4	EPOXY	36	26	TC	PVC	EPOXY & RTV	105	P60, P65B
T0511/A3	2	1/4	.187	1-1/4	EPOXY	36	26	TC	PVC	EPOXY & RTV	105	P60, P65D
T0511/B1	1	0	.187	1-1/4	EPOXY	36	26	SPC	TFE	EPOXY & RTV	150	P60, P65B
T0511/B2	2	1/8	.187	1-1/4	EPOXY	36	26	SPC	TFE	EPOXY & RTV	150	P60, P65B
T0511/B3	2	1/4	.187	1-1/4	EPOXY	36	26	SPC	TFE	EPOXY & RTV	150	P60, P65D
T0512/A1	1	0	.250	1-1/2	EPOXY	36	22	TC	PVC	EPOXY & RTV	105	P85, P100B
T0512/A2	2	1/8	.250	1-1/2	EPOXY	36	22	TC	PVC	EPOXY & RTV	105	P85, P100B
T0512/A3	2	1/4	.250	1-1/2	EPOXY	36	22	TC	PVC	EPOXY & RTV	105	P85, P100D
T0512/B1	1	0	.250	1-1/2	EPOXY	36	22	SPC	TFE	EPOXY & RTV	150	P85, P100B
T0512/B2	2	1/8	.250	1-1/2	EPOXY	36	22	SPC	TFE	EPOXY & RTV	150	P85, P100B
T0512/B3	2	1/4	.250	1-1/2	EPOXY	36	22	SPC	TFE	EPOXY & RTV	150	P85, P100D
T0513/A1	1	0	.187	1-1/4	STEATITE	36	26	Ni	FIBERGLASS	CERAMIC	450	HTP's
T0513/A2	2	1/8	.187	1-1/4	STEATITE	36	26	Ni	FIBERGLASS	CERAMIC	450	HTP's
T0514/A1	1	0	.156	1-1/4	SIL. RUBBER	36	28	TC	PVC	RTV	105	P60, P65B
T0514/A2	2	1/8	.156	1-1/4	SIL. RUBBER	36	28	TC	PVC	RTV	105	P60, P65B
T0514/A3	2	1/4	.156	1-1/4	SIL. RUBBER	36	28	TC	PVC	RTV	105	P60, P65D
T0514/B1	1	0	.156	1-1/4	SIL. RUBBER	36	28	SPC	TFE	RTV	200	P60, P65B
T0514/B2	2	1/8	.156	1-1/4	SIL. RUBBER	36	28	SPC	TFE	RTV	200	P60, P65B
T0514/B3	2	1/4	.156	1-1/4	SIL. RUBBER	36	28	SPC	TFE	RTV	200	P60, P65D

			INSULATING SLEEVE			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T0515/A1	1	0	.140	1-1/4	DELRIN	36	28	TC	PVC	EPOXY	80	P85B
T0515/A2	2	1/8	.140	1-1/4	DELRIN	36	28	TC	PVC	EPOXY	80	P85B, FP's
T0515/A3	2	1/4	.140	1-1/4	DELRIN	36	28	TC	PVC	EPOXY	80	P85D, FP's
T0515/B1	1	0	.140	1-1/4	DELRIN	36	28	SPC	TFE	EPOXY	80	P85B
T0515/B2	2	1/8	.140	1-1/4	DELRIN	36	28	SPC	TFE	EPOXY	80	P85B, CTFP's
T0515/B3	2	1/4	.140	1-1/4	DELRIN	36	28	SPC	TFE	EPOXY	80	P85D, CTFP's
T0516/A1	1	0	.140	1	POLYOLEFIN	36	28	TC	PVC	EPOXY	105	P85, P100B
T0516/A2	2	1/8	.140	1-1/4	POLYOLEFIN	36	28	TC	PVC	EPOXY	105	P85, P100B
T0516/A3	2	1/4	.140	1-1/2	POLYOLEFIN	36	28	TC	PVC	EPOXY	105	P85, P100D
T0516/B1	1	0	.140	1	POLYOLEFIN	36	28	SPC	TFE	EPOXY	125	P85, P100B
T0516/B2	2	1/8	.140	1-1/4	POLYOLEFIN	36	28	SPC	TFE	EPOXY	125	P85, P100B
T0516/B3	2	1/4	.140	1-1/2	POLYOLEFIN	36	28	SPC	TFE	EPOXY	125	P85, P100D
								BC				
T0500					(FLEXIBLE)			OFHC			60	
SERIES		a/r	a/r	a/r	MYLAR	a/r	18	TC	PVC	EPOXY	80	P60
OPTIONS					PVC		20	SPC	TEFLON (TFE)	RTV	105	P65
					TEFLON (TFE)		22	NPC	TEFLON (FEP)	CERAMIC	125	P85
					TEFLON (FEP)		24	Ni	KYNAR		150	P100
					FIBERGLASS		26		FIBERGLASS		175	
					POLYETHYLENE		28		SILICONE RUBBER		200	FP07
					KYNAR		30				260	FP10
					POLYOLEFIN		32				300	FP14
					RUBBER						450	
					NEOPRENE							CTP60
					POLYURETHANE							CTP65
					TYGON							CTP85
					SILASTIC							CTP100
					KAPTON							
												CTFP07
					(RIGID)							CTFP10
					DELRIN							CTFP14
					LEXAN							
					EPOXY							HTP60
					NYLON							HTP65
					ACRYLIC							HTP85
					PHENOLIC							HTP100
					STEATITE							

TUBING: RIGID PLASTICS AND INSULATORS

Support tubings for assemblies can be specified from rigid plastic formulations or insulation materials that are commercially available in the form of cast or extruded tubes. Rod stock can also be selected, however, machining costs will make these selections more costly. Some common materials which are available as tube or rod stock are as follows:

ABS
ACETAL (DELRIN)
ACRYLIC
FLUOROPLASTIC — CTFE
FLUOROPLASTIC — FEP
FLUOROPLASTIC — TFE
NYLON
PHENOLIC
POLYCARBONATE (LEXAN)
POLYETHYLENE
POLYPROPYLENE
POLYSTYRENE
POLYURETHANE
PVC, RIGID
POLYVINYLIDENE FLUORIDE (KYNAR)
REINFORCED LAMINATES
CAST EPOXY
STEATITE
KRAFT PAPER

TUBING: FLEXIBLE PLASTICS, ELASTOMERS AND INSULATING SLEEVES

These materials can be used to provide electrical insulation over circuit interconnections or they may be used to provide electrical insulation and environmental protection over the thermistor and extension leads.

Sleeves may be cemented into position with adhesives or some may be heat shrunk into position as required. Protective sheaths may be open ended or they may be sealed by heat, solvents or adhesives depending upon the type of material selected.

The following are commonly used flexible plastic tubings, elastomeric tubings or insulating tubings which may be specified:

INSULATING SLEEVES:

FIBERGLASS, NATURAL
FIBERGLASS, SILICONE IMPREGNATED
KAPTON
NOMEX
POLYIMIDE

SHRINK TUBINGS:

KYNAR
MYLAR
POLYOLEFIN
POLYOLEFIN, CROSS-LINKED
POLYOLEFIN, MELTABLE WALL
POLYVINYL CHLORIDE (PVC)
TEFLON, FEP
TEFLON, TFE
POLYETHYLENE

NON-SHRINK TUBINGS (EXTRUDED):

POLYETHYLENE, RADIOPAQUE MEDICAL
POLYETHYLENE, NON RADIOPAQUE MEDICAL
POLYVINYL CHLORIDE (PVC)
POLYURETHANE
TEFLON, FEP
TEFLON, TFE
TYGON
VINYL, MEDICAL GRADE

ELASTOMERS:

BUNA-N
NEOPRENE
SILICONE RUBBER
SILICONE, MEDICAL GRADE
VITON

COATINGS:

Various coatings can be provided for additional protection against the effects of moisture, solvents or chemicals. Lacquers, varnishes, liquid epoxy resins, polyurethanes, vinyls and silicones are commonly used for dip coatings or sprayed finishes on various special assemblies.

SERIES T0600

STYLE: A series T0600 assembly consists of a large bead, probe or chip thermistor attached to insulated hook up wire and encapsulated into a closed end insulating sleeve or tube. The insulating material may be machined or molded closed or may be heat sealed closed. The extension leads range in size from 18 to 32 gauge in various alloys and with various insulation materials.

APPLICATION: The series T0600 assemblies are suitable for general temperature measurement, compensation or control applications where limited depth of immersion into conductive or corrosive fluids is required. They are not fully immersible over the back end of the insulating tube or sleeve without further modifications or encapsulation into other housing or enclosures. The series T0600 assemblies are relatively large to accommodate the thermistor and hook up wire, consequently, response times are slower and should be considered in the application.

FIGURE 1 (HEAT SEALED)

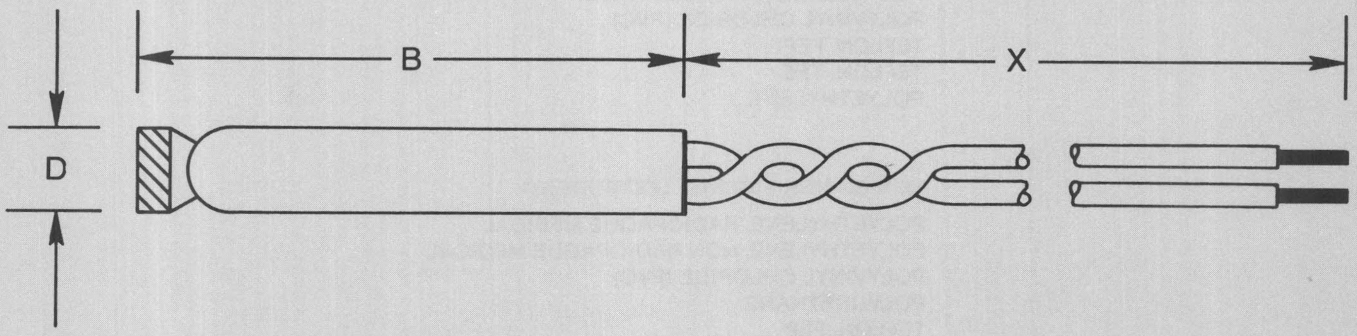


FIGURE 2 (MOLDED)

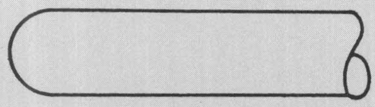
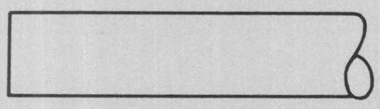


FIGURE 3 (MACHINED)



ASSEMBLY PREFIX	FIG.	INSULATING SLEEVE			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
		DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T0601/A1	1	.090	3	MYLAR	36	32	TC	PVC	—	105	BR42, BR55
T0601/B1	1	.090	3	MYLAR	36	32	SPC	TFE	—	125	BR42, BR55
T0602/A1	1	.110	3	MYLAR	36	28	TC	PVC	—	105	P60, P65
T0602/B1	1	.110	3	MYLAR	36	28	SPC	TFE	—	125	P60, P65
T0603/A1	1	.125	3	MYLAR	36	24	TC	PVC	—	105	P85, P100
T0603/B1	1	.125	3	MYLAR	36	24	SPC	TFE	—	125	P85, P100
T0604/A1	1	.100	3	POLYETHYLENE	36	32	TC	PVC	EPOXY	80	BR42, BR55
T0604/B1	1	.100	3	POLYETHYLENE	36	32	SPC	TFE	EPOXY	80	BR42, BR55
T0605/A1	1	.125	3	POLYETHYLENE	36	28	TC	PVC	EPOXY	80	P60, P65
T0605/B1	1	.125	3	POLYETHYLENE	36	28	SPC	TFE	EPOXY	80	P60, P65
T0606/A1	1	.150	3	POLYETHYLENE	36	24	TC	PVC	EPOXY	80	P85, P100
T0606/B1	1	.150	3	POLYETHYLENE	36	24	SPC	TFE	EPOXY	80	P85, P100
T0607/A1	2	.125	1/2	PVC	36	32	TC	PVC	EPOXY	105	BR55, P60, P65
T0607/B1	2	.125	1/2	PVC	36	32	SPC	TFE	EPOXY	105	BR55, P60, P65
T0608/A1	2	.150	3/4	PVC	36	28	TC	PVC	EPOXY	105	P85, P100
T0608/B1	2	.150	3/4	PVC	36	28	SPC	TFE	EPOXY	105	P85, P100
T0609/A1	3	.125	1	DELRIN	36	28	TC	PVC	EPOXY	80	BR55, P60, P65
T0609/B1	3	.125	1	DELRIN	36	28	SPC	TFE	EPOXY	80	BR55, P60, P65
T0610/A1	3	.187	1	DELRIN	36	24	TC	PVC	EPOXY	80	P85, P100
T0610/B1	3	.187	1	DELRIN	36	24	SPC	TFE	EPOXY	80	P85, P100
T0611/A1	3	.125	1	ACRYLIC	36	28	TC	PVC	EPOXY	80	BR55, P60, P65
T0611/B1	3	.125	1	ACRYLIC	36	28	SPC	TFE	EPOXY	80	BR55, P60, P65
T0612/A1	3	.187	1	ACRYLIC	36	24	TC	PVC	EPOXY	80	P85, P100
T0612/B1	3	.187	1	ACRYLIC	36	24	SPC	TFE	EPOXY	80	P85, P100
T0613/A1	3	.187	1-1/4	EPOXY	36	26	TC	PVC	EPOXY	105	BR55, P60, P65
T0613/B1	3	,187	1-1/4	EPOXY	36	26	SPC	TFE	EPOXY	150	BR55, P60, P65
T0614/A1	3	.250	1-1/4	EPOXY	36	22	TC	PVC	EPOXY	105	P85, P100
T0614/B1	3	.250	1-1/4	EPOXY	36	22	SPC	TFE	EPOXY	150	P85, P100
T0615/A1	3	.187	1-1/4	LEXAN	36	26	TC	PVC	EPOXY	105	BR55, P60, P65
T0615/B1	3	.187	1-1/4	LEXAN	36	26	SPC	TFE	EPOXY	120	BR55, P60, P65
T0616/A1	3	.250	1-1/4	LEXAN	36	22	TC	PVC	EPOXY	105	P85, P100
T0616/B1	3	.250	1-1/4	LEXAN	36	22	SPC	TFE	EPOXY	120	P85, P100
				(FLEXIBLE)							
T0600	1	a/r	a/r	MYLAR	a/r	18	BC	PVC	EPOXY	60	BR32
SERIES	2			POLYETHYLENE		20	OFHC	TEFLON (FEP)	RTV	80	BR42
OPTIONS	3			PVC		22	TC	TEFLON (TFE)		105	BR55
				POLYOLEFIN		24	SPC	KYNAR		120	
						26	NPC	FIBERGLASS		125	P60
						28	Ni	SIL. RUBBER		150	P65
						30		KAPTON			P85
				(RIGID)		32		POLYETHYLENE			P100
				DELRIN							
				EPOXY							MC50
				ACRYLIC							DC95
				LEXAN							

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

SERIES T1000

STYLE: A series T1000 assembly consists of a bead or chip thermistor attached to small diameter extension leads and encapsulated into a small diameter metal tubing. The tubing is open ended and is generally stainless steel, although brass, aluminum or other metals may be specified. The extension leads are bifilar magnet wire or twin conductor ribbon cable. The thermistor may be completely encapsulated for maximum protection or may be partially exposed at the tip for faster response.

APPLICATION: The series T1000 assemblies are extremely rugged sensor packages which may be used as is for many general temperature measurement applications. The rigid metal tubing permits the assemblies to be easily handled in further assembly operations such as molding or encapsulation into other housings or enclosures. The small sizes available provide fast response times without sacrificing ruggedness or protection. The assemblies are not suitable for direct immersion in conductive or corrosive fluids, without further assembly or modifications. Please consult the factory for specific information regarding material selection for such applications.

FIGURE 1

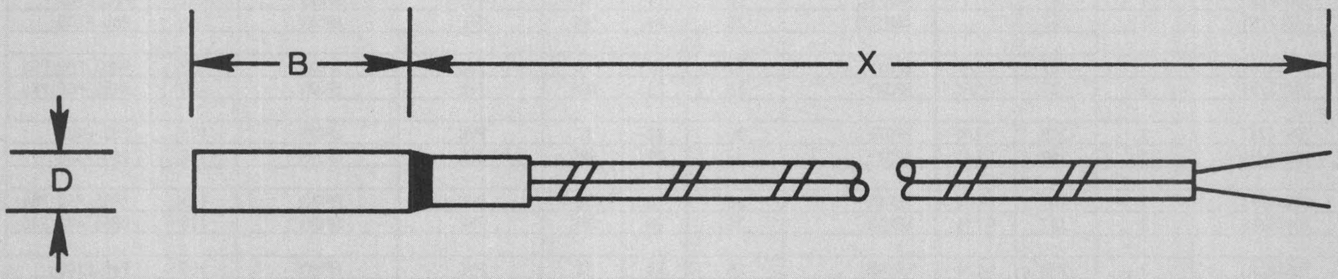
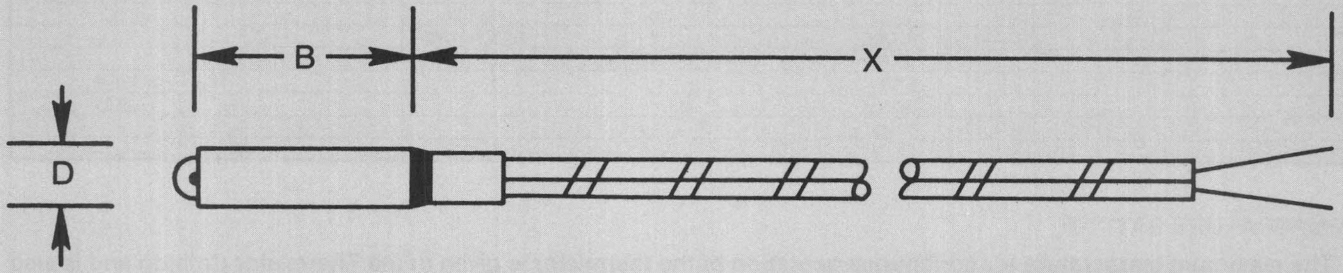


FIGURE 2



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
		DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T1001/A1	1	.022	1/2	24XX SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	B05 B07
T1001/A2	2	.022	1/2	24XX SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	B05 B07
T1001/B1	1	.022	1/2	24XX SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	B05 B07
T1001/B2	2	.022	1/2	24XX SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	B05 B07
T1002/A1	1	.028	1/2	22TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	B10 BR11
T1002/A2	2	.028	1/2	22TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	B10 BR11
T1002/B1	1	.028	1/2	22TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	B10 BR11
T1002/B2	2	.028	1/2	22TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	B10 BR11
T1003/A1	1	.032	5/8	21TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR14 B14
T1003/A2	2	.032	5/8	21TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR14 B14
T1003/B1	1	.032	5/8	21TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR14 B14
T1003/B2	2	.032	5/8	21TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR14 B14
T1004/A1	1	.0355	5/8	20TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR16
T1004/A2	2	.0355	5/8	20TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR16
T1004/B1	1	.0355	5/8	20TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR16
T1004/B2	2	.0355	5/8	20TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR16
T1005/A1	1	.0425	3/4	19TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR23
T1005/A2	2	.0425	3/4	19TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR23
T1005/B1	1	.0425	3/4	19TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR23
T1005/B2	2	.0425	3/4	19TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR23
T1006/A1	1	.050	1	18TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32
T1006/A2	2	.050	1	18TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32
T1006/B1	1	.050	1	18TW SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR32
T1006/B2	2	.050	1	18TW SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR32
T1007/A1	1	.072	1-1/4	15 SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR42
T1007/A2	2	.072	1-1/4	15 SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR42
T1007/B1	1	.072	1-1/4	15 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR42
T1007/B2	2	.072	1-1/4	15 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR42
T1008/A1	1	.083	1-1/4	14 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR55
T1008/A2	2	.083	1-1/4	14 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR55
T1008/B1	1	.083	1-1/4	14 SS	6	32	BC	HEAVY ISOMID	EPOXY	175	BR55
T1008/B2	2	.083	1-1/4	14 SS	6	32	BC	HEAVY ISOMID	EPOXY	175	BR55
T1008/C1	1	.083	1-1/4	14 SS	6	32	BC	POLY/NYLON	EPOXY	125	BR55
T1008/C2	2	.083	1-1/4	14 SS	6	32	BC	POLY/NYLON	EPOXY	125	BR55
T1009/A1	1	.095	1-1/2	13 SS	12	32	TC	PVC	EPOXY	105	MC50
T1009/A2	2	.095	1-1/2	13 SS	12	32	TC	PVC	EPOXY	105	MC50
T1009/B1	1	.095	1-1/2	13 SS	12	32	SPC	TFE	EPOXY	200	BR55
T1009/B2	2	.095	1-1/2	13 SS	12	32	SPC	TFE	EPOXY	200	BR55
T1010/A1	1	.125	1-1/2	1/8″ SS	12	30	TC	PVC	EPOXY	105	DC95
T1010/A2	2	.125	1-1/2	1/8″ SS	12	30	TC	PVC	EPOXY	105	DC95
T1010/B1	1	.125	1-1/2	1/8″ SS	12	30	SPC	TFE	EPOXY	200	BR55
T1010/B2	2	.125	1-1/2	1/8″ SS	12	30	SPC	TFE	EPOXY	200	BR55
T1000											
SERIES	1	.022	a/r	SS304	a/r	32	TC	PVC	EPOXY	60	B05
OPTIONS	2	to		BRASS		30	TC	PVC	RTV	105	B07
		.250		ALUMINUM						125	B10
						32	SPC	TFE		175	B14
						30	SPC	TFE		200	B35
										260	B43
						36	BC	HEAVY ISOMID			
						34	BC	HEAVY ISOMID			BR11
						32	BC	HEAVY ISOMID			BR14
											BR16
						40	Ni 200	HEAVY ISOMID			BR23
						38	Ni 200	HEAVY ISOMID			BR32
											BR42
						40	Ni 270	HEAVY ISOMID			BR55
						38	Ni 270	HEAVY ISOMID			
											MC50
						32	BC	POLY/NYLON			DC95

SERIES T1100

STYLE: A series T1100 assembly consists of a miniature thermistor attached to extension leads and encapsulated into a small diameter metal tubing. The tubing is open ended and is generally stainless steel, although brass, aluminum or other metals may be specified. The extension leads are bifilar magnet wire or twin conductor ribbon cable. The thermistor probe may be completely encapsulated for maximum protection or may be partially exposed at the tip for faster response.

APPLICATION: The series T1100 assemblies are extremely rugged, small size, fast response sensors which can be used as is in many general temperature measurement applications. The rigid metal tubing makes the assemblies easy to handle when further assembly operations are required, such as molding or encapsulation into other housings or enclosures. The longer glass seal of the miniature probes offers an advantage in the exposed tip assemblies in that a better moisture seal may be accomplished. Thus, the series T1100 assemblies are suitable for limited immersion in conductive or corrosive fluids. With further assembly or with modifications, the assemblies can be completely immersed in conductive fluids. Please consult the factory for specific information regarding material selection for applications which involve conductive or corrosive fluids.

FIGURE 1

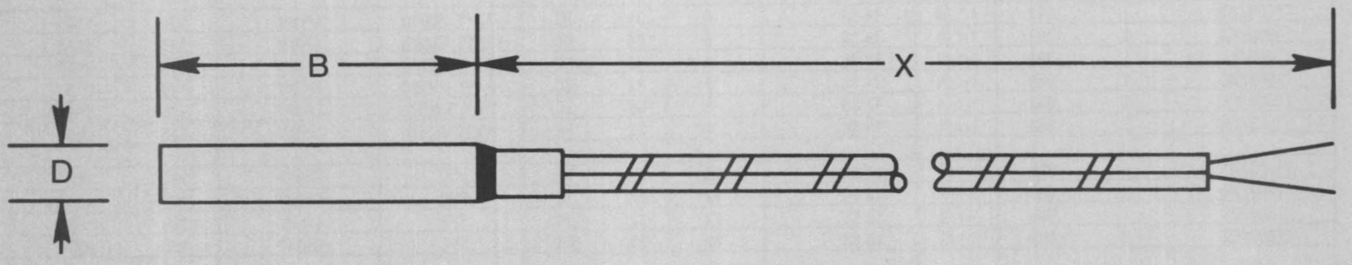
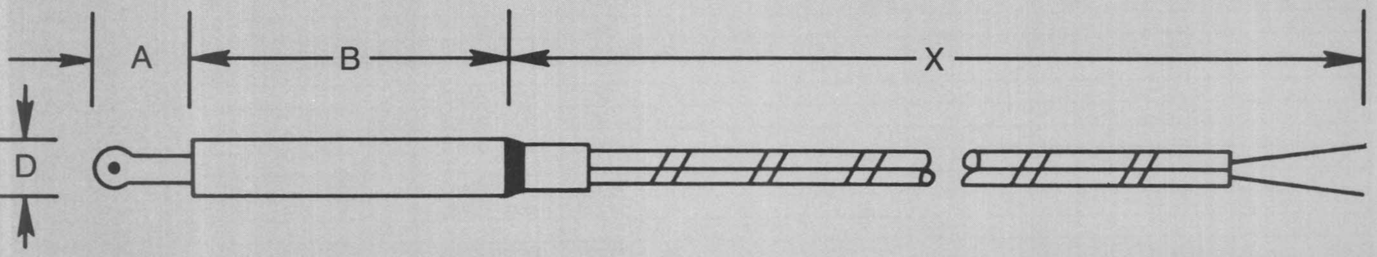


FIGURE 2



ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	TUBING			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T1101/A1	1	0	.0355	1	20 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P20
T1101/A2	2	.030	.0355	1	20 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P20
T1101/B1	1	0	.0355	1	20 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P20
T1101/B2	2	.030	.0355	1	20 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P20
T1102/A1	1	0	.0425	1	19 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P25
T1102/A2	2	.040	.0425	1	19 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P25
T1102/B1	1	0	.0425	1	19 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P25
T1102/B2	2	.040	.0425	1	19 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P25
T1103/A1	1	0	.050	1	18 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P30
T1103/A2	2	.050	.050	1	18 TW SS	6	40	Ni270	HEAVY ISOMID	EPOXY	175	P30
T1103/B1	1	0	.050	1	18 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P30
T1103/B2	2	.050	.050	1	18 TW SS	6	38	Ni200	HEAVY ISOMID	EPOXY	175	P30
T1104/A1	1	0	.095	1-1/2	13 SS	12	32	TC	PVC	EPOXY	105	P20, 25, 30
T1104/A2	2	.050	.095	1-1/2	13 SS	12	32	TC	PVC	EPOXY	105	P20, 25, 30
T1104/B1	1	0	.095	1-1/2	13 SS	12	32	SPC	TFE	EPOXY	200	P20, 25, 30
T1104/B2	2	.050	.095	1-1/2	13 SS	12	32	SPC	TFE	EPOXY	200	P20, 25, 30
T1100	1	a/r	.032	a/r	SS 304	a/r	32	TC	PVC	EPOXY	60	P20
SERIES	2		to		BRASS		30	TC	PVC	RTV	105	P25
OPTIONS			.250		ALUMINUM						125	P30
							32	SPC	TFE		175	
							30	SPC	TFE		200	
											260	
							36	BC	HEAVY ISOMID			
							34	BC	HEAVY ISOMID			
							32	BC	HEAVY ISOMID			
							40	Ni200	HEAVY ISOMID			
							38	Ni200	HEAVY ISOMID			
							40	Ni270	HEAVY ISOMID			
							38	Ni270	HEAVY ISOMID			
							32	BC	POLY/NYLON			

TUBING: STAINLESS STEEL

The most versatile and useful metal tubing in the Sensor Handbook is stainless steel. Tubing is available in hypodermic gauge sizes from #6 (.203"O.D.) to #25 (.020"O.D.) in alloy T304. Standard fractional tubing (ASTM A269) and close tolerance fractional tubing (ASTM A632) is available in alloys 304 or 316 as seamless or welded stock. Other series 300 or 400 alloys, special wall sizes and metric sizes can be specified for custom assemblies. The basic sizes most commonly used in the Sensor Handbook are listed in the following table.

SIZE	O.D. (REF.)	I.D. (REF.)
#24xx	.022	.016
#22TW	.028	.020
1/32"	.0313	.0193
#21TW	.032	.022
#20TW	.0355	.0255
#19TW	.0425	.0325
#18TW	.050	.042
#17TW	.059	.046
1/16"	.0625	.0465
#16	.065	.047
#15	.072	.054
#14	.083	.063
3/32"	.0938	.0638
#13	.095	.071
#12TW	.109	.091
#11	.120	.094
1/8"	.125	.105
#10	.134	.106
#9	.148	.118
5/32"	.1563	.1243
#8	.165	.135
#7	.180	.150
3/16"	.1875	.1555
#6	.203	.173
7/32"	.2188	.1868
1/4"	.250	.210

SERIES T1200

STYLE: A series T1200 assembly consists of a bead, small probe or chip thermistor attached to small diameter extension leads and encapsulated into a closed end tubing. The extension leads are bifilar magnet wire or twin conductor ribbon cable. The tubing is generally stainless steel, although other materials may be specified, and the end is closed in one of three basic shapes.

APPLICATION: The series T1200 assemblies are extremely rugged, small sized, fast response sensors which provide the maximum protection for the thermistor in harsh environments. The closed end tubing allows the assemblies to be immersed in conductive or corrosive fluids up to almost the full length of the tubing. The assemblies are easy to handle and can be molded or encapsulated into other housings or enclosures as needed.

FIGURE 1 (SPHERICAL POINT)

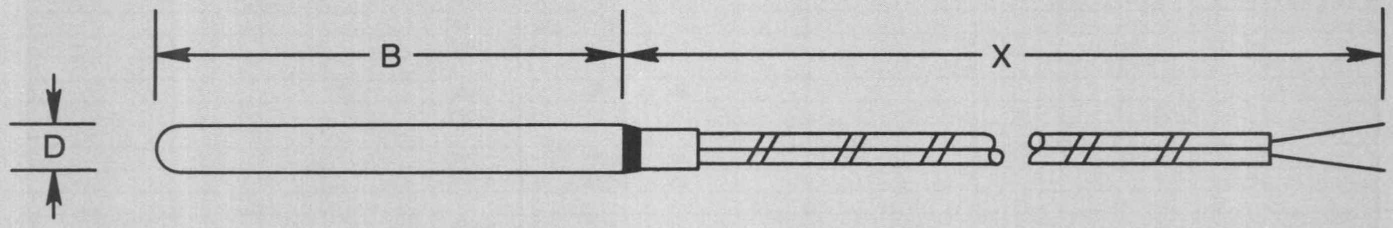


FIGURE 2 (FLAT, PLUG WELDED POINT)

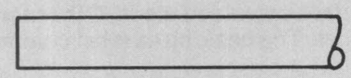
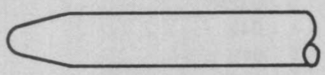


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
		DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T1201/A1	1	.022	1	24XX SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	B05 B07
T1201/B1	1	.022	1	24XX SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	B05 B07
T1202/A1	1	.028	1	22TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR11 B10
T1202/B1	1	.028	1	22TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR11 B10
T1203/A1	1	.032	1	21TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR14 B14
T1203/B1	1	.032	1	21TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR14 B14
T1204/A1	1	.0355	1-1/4	20TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR16 P20
T1204/B1	1	.0355	1-1/4	20TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR16 P20
T1205/A1	1	.0425	1-1/4	19TW SS	6	40	Ni 270	HEAVY ISOMID	EPOXY	175	BR23 P25
T1205/B1	1	.0425	1-1/4	19TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR23 P25
T1206/A1	1	.050	1-1/2	18TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32 P30
T1206/A2	2	.050	1-1/2	18TW SS	6	38	Ni 200	HEAVY ISOMID	EPOXY	175	BR32 P30
T1206/B1	1	.050	1-1/2	18TW SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR32 P30
T1206/B2	2	.050	1-1/2	18TW SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR32 P30
T1207/A1	1	.072	2	15 SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR42 B43
T1207/A2	2	.072	2	15 SS	6	36	BC	HEAVY ISOMID	EPOXY	175	BR42 B43
T1207/B1	1	.072	2	15 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR42 B43
T1207/B2	2	.072	2	15 SS	6	34	BC	HEAVY ISOMID	EPOXY	175	BR42 B43
T1208/A1	1	.083	2-1/2	14 SS	12	32	BC	POLY/NYLON	EPOXY	125	BR55
T1208/A2	2	.083	2-1/2	14 SS	12	32	BC	POLY/NYLON	EPOXY	125	BR55
T1208/B1	1	.083	2-1/2	14 SS	12	32	BC	HEAVY ISOMID	EPOXY	175	BR55
T1208/B2	2	.083	2-1/2	14 SS	12	32	BC	HEAVY ISOMID	EPOXY	175	BR55
T1209/A1	1	.095	3	13 SS	12	32	TC	PVC	EPOXY	105	PAIRS
T1209/A2	2	.095	3	13 SS	12	32	TC	PVC	EPOXY	105	PAIRS
T1209/A3	3	.095	3	13 SS	12	32	TC	PVC	EPOXY	105	PAIRS
T1209/B1	1	.095	3	13 SS	12	32	SPC	TFE	EPOXY	200	PAIRS
T1209/B2	2	.095	3	13 SS	12	32	SPC	TFE	EPOXY	200	PAIRS
T1209/B3	3	.095	3	13 SS	12	32	SPC	TFE	EPOXY	200	PAIRS
T1210/A1	1	.125	3	1/8 SS	12	30	TC	PVC	EPOXY	105	DC95
T1210/A2	2	.125	3	1/8 SS	12	30	TC	PVC	EPOXY	105	DC95
T1210/A3	3	.125	3	1/8 SS	12	30	TC	PVC	EPOXY	105	DC95
T1210/B1	1	.125	3	1/8 SS	12	30	SPC	TFE	EPOXY	200	PAIRS
T1210/B2	2	.125	3	1/8 SS	12	30	SPC	TFE	EPOXY	200	PAIRS
T1210/B3	3	.125	3	1/8 SS	12	30	SPC	TFE	EPOXY	200	PAIRS
T1200	1	.022	a/r	SS304	a/r	32	TC	PVC	EPOXY	60	B05
SERIES	2	to		BRASS		30	TC	PVC	RTV	105	B07
OPTIONS	3	.250		ALUMINUM						125	B10
						32	SPC	TFE		175	B14
						30	SPC	TFE		200	B35
										260	B43
						36	BC	HEAVY ISOMID			
						34	BC	HEAVY ISOMID			BR11
						32	BC	HEAVY ISOMID			BR14
											BR16
						40	Ni 200	HEAVY ISOMID			BR23
						38	Ni 200	HEAVY ISOMID			BR32
											BR42
						40	Ni 270	HEAVY ISOMID			BR55
						38	Ni 270	HEAVY ISOMID			
											P20
						32	BC	POLY/NYLON			P25
											P30
											MC50
											DC95

TERMINATIONS:

The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

SERIES T1300

STYLE: A series T1300 assembly consists of a large bead or chip thermistor attached to insulated hook up wire and encapsulated into an open ended metal tubing. The tubing material is generally stainless steel, however, aluminum, brass or other materials may be specified. The extension leads range in size from 18 to 32 gauge and come in various alloys and with various insulation materials. The thermistor may be completely encapsulated for maximum protection or it may be partially exposed for faster response.

APPLICATION: The series T1300 assemblies are extremely rugged, medium sized sensor packages with good response times. They are suitable for many temperature measurement, compensation or control applications. The rigid metal tubing makes the assemblies easy to handle when further assembly operations are required, such as molding or encapsulation into other housings or enclosures. The assemblies are not suitable for immersion in conductive or corrosive fluids, however, with further assembly or modification they may be used for such applications.

FIGURE 1

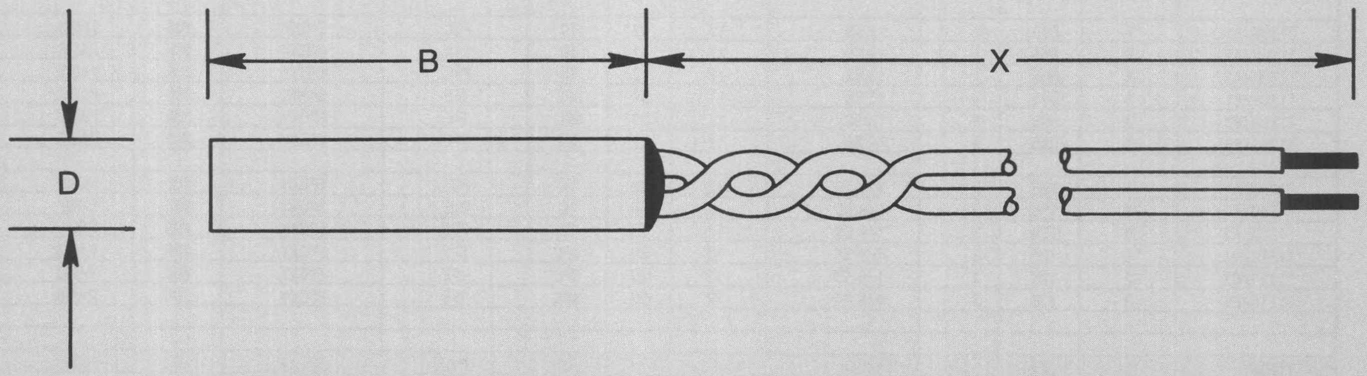
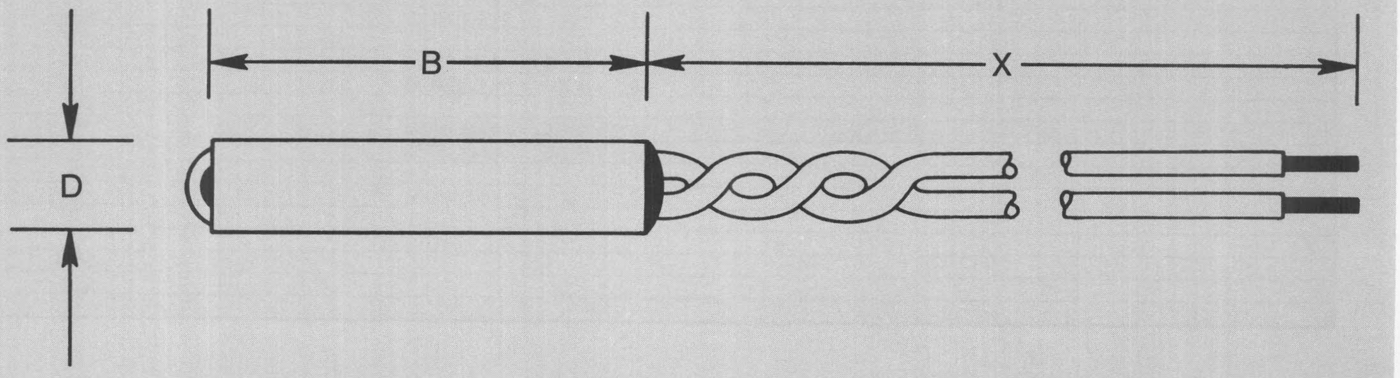


FIGURE 2



THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

		TUBING			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
T1301/A1	1	.083	1	14 SS	48	30	OFHC	KYNAR	EPOXY	125	BR32 B35
T1301/A2	2	.083	1	14 SS	48	30	OFHC	KYNAR	EPOXY	125	BR32 B35
T1301/B1	1	.083	1	14 SS	48	32	SPC	TFE	EPOXY	200	BR32 B35
T1301/B2	2	.083	1	14 SS	48	32	SPC	TFE	EPOXY	200	BR32 B35
T1302/A1	1	.095	1	13 SS	48	30	OFHC	KYNAR	EPOXY	125	BR42 B43
T1302/A2	2	.095	1	13 SS	48	30	OFHC	KYNAR	EPOXY	125	BR42 B43
T1302/B1	1	.095	1	13 SS	48	30	SPC	TFE	EPOXY	200	BR42 B43
T1302/B2	2	.095	1	13 SS	48	30	SPC	TFE	EPOXY	200	BR42 B43
T1303/A1	1	.109	1	12TW SS	48	32	TC	PVC	EPOXY	105	BR55 MC50
T1303/A2	2	.109	1	12TW SS	48	32	TC	PVC	EPOXY	105	BR55 MC50
T1303/B1	1	.109	1	12TW SS	48	30	SPC	TFE	EPOXY	200	BR55
T1303/B2	2	.109	1	12TW SS	48	30	SPC	TFE	EPOXY	200	BR55
T1304/A1	1	.125	1-1/4	1/8″ SS	48	28	TC	PVC	EPOXY	105	BR55 DC95
T1304/A2	2	.125	1-1/4	1/8″ SS	48	28	TC	PVC	EPOXY	105	BR55 DC95
T1304/B1	1	.125	1-1/4	1/8″ SS	48	28	SPC	TFE	EPOXY	200	BR55
T1304/B2	2	.125	1-1/4	1/8″ SS	48	28	SPC	TFE	EPOXY	200	BR55
T1305/A1	1	.156	1-1/4	5/32″ SS	48	24	TC	PVC	EPOXY	105	BR55 DC95
T1305/A2	2	.156	1-1/4	5/32″ SS	48	24	TC	PVC	EPOXY	105	BR55 DC95
T1305/B1	1	.156	1-1/4	5/32″ SS	48	24	SPC	TFE	EPOXY	200	BR55
T1305/B2	2	.156	1-1/4	5/32″ SS	48	24	SPC	TFE	EPOXY	200	BR55
T1306/A1	1	.187	1-1/2	3/16″ SS	48	22	TC	PVC	EPOXY	105	BR55 DC95
T1306/A2	2	.187	1-1/2	3/16″ SS	48	22	TC	PVC	EPOXY	105	BR55 DC95
T1306/B1	1	.187	1-1/2	3/16″ SS	48	22	SPC	TFE	EPOXY	200	BR55
T1306/B2	2	.187	1-1/2	3/16″ SS	48	22	SPC	TFE	EPOXY	200	BR55
							OFHC				
T1300	1	.072	a/r	SS304	a/r	18	BC	PVC	EPOXY	60	B35
SERIES	2	to		BRASS		20	TC	TEFLON (FEP)	RTV	80	B43
OPTIONS		.250		ALUMINUM		22	SPC	TEFLON (TFE)	CERAMIC	105	BR32
						24	NPC	KYNAR		125	BR42
						26	Ni	FIBERGLASS		175	BR55
						28		SIL. RUBBER		200	
						30		KAPTON		260	MC50
						32		POLYETHYLENE		300	DC95

TUBING: ALUMINUM

Aluminum tubing is available in diameters of 1/8″, 3/16″ and 1/4″ with standard wall thicknesses from .020″ to .035″. The most commonly specified alloy is D6061-T6, however, other alloys may be available on special order. The basic sizes of alloy D6061-T6 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/8) .125	.085	.020
(3/16) .1875	.1435	.022
(1/4) .250	.194	.028

TUBING: BRASS

Brass tubing is available in fractional sizes of 1/16″ to 1/4″ diameter with the wall thickness being 1/64″ or 1/32″. The most commonly specified alloy is #330. Special precision tubing diameters and wall thicknesses ranging from .012″ to .065″ (as appropriate) may be available on special order. The basic sizes of alloy #330 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/16) .0625	.0313	.0156
(3/32) .0938	.0625	.0156
(1/8) .125	.0625	.0313
(5/32) .1563	.0938	.0313
(3/16) .1875	.125	.0313
(7/32) .2188	.1563	.0313
(1/4) .250	.1875	.0313

SERIES T1400

STYLE: A series T1400 assembly consists of a large probe thermistor attached to insulated hook up wire and encapsulated into an open end metal tubing. The tubing material is generally stainless steel, however, aluminum, brass or other materials may be specified. The extension leads range in size from 18 to 32 gauge and come in various alloys and with various insulation materials. The thermistor probe may be fully encapsulated for maximum protection or may be exposed at the tip for fast response.

APPLICATION: The series T1400 assemblies are extremely rugged medium sized sensor packages with good to fast response times. They may be used in many general temperature measurement applications. The longer glass seal of the large probe thermistors makes them ideally suited for limited immersion in conductive or corrosive fluids in that a much better moisture seal can be accomplished. When additional assembly or modifications are performed the assemblies can be fully immersible in conductive or corrosive fluids. Please consult the factory for specific information regarding material selection for such applications.

FIGURE 1

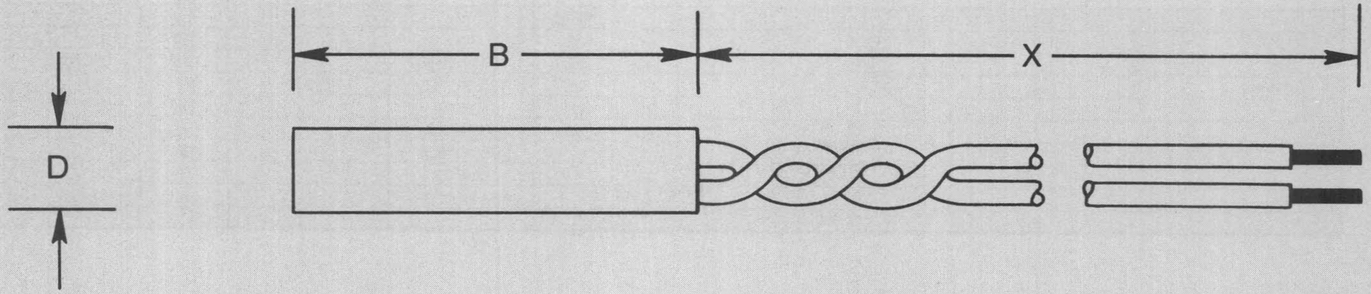
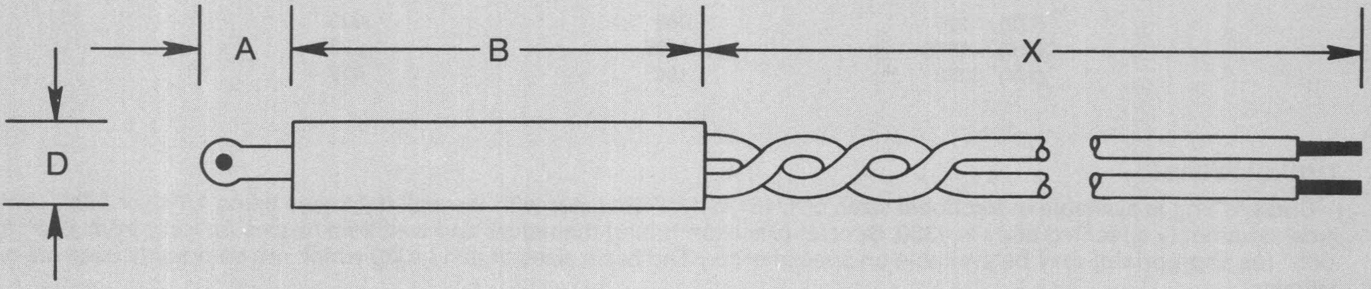


FIGURE 2



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	TUBING			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION			
T1401/A1	1	—	.083	1-1/4	14 SS	48	30	OFHC	KYNAR	EPOXY	125	P60B
T1401/A2	2	1/16	.083	1-1/4	14 SS	48	30	OFHC	KYNAR	EPOXY	125	P60B
T1401/A3	2	1/8	.083	1-1/4	14 SS	48	30	OFHC	KYNAR	EPOXY	125	P60D
T1401/B1	1	—	.083	1-1/4	14 SS	48	32	SPC	TFE	EPOXY	200	P60B
T1401/B2	2	1/16	.083	1-1/4	14 SS	48	32	SPC	TFE	EPOXY	200	P60B
T1401/B3	2	1/8	.083	1-1/4	14 SS	48	32	SPC	TFE	EPOXY	200	P60D
T1402/A1	1	—	.095	1-1/4	13 SS	48	30	OFHC	KYNAR	EPOXY	125	P65B
T1402/A2	2	1/16	.095	1-1/4	13 SS	48	30	OFHC	KYNAR	EPOXY	125	P65B
T1402/A3	2	1/8	.095	1-1/4	13 SS	48	30	OFHC	KYNAR	EPOXY	125	P65D
T1402/B1	1	—	.095	1-1/4	13 SS	48	30	SPC	TFE	EPOXY	200	P65B
T1402/B2	2	1/16	.095	1-1/4	13 SS	48	30	SPC	TFE	EPOXY	200	P65B
T1402/B3	2	1/8	.095	1-1/4	13 SS	48	30	SPC	TFE	EPOXY	200	P65D
T1403/A1	1	—	.109	1-1/4	12TW SS	48	32	TC	PVC	EPOXY	105	P85B
T1403/A2	2	1/16	.109	1-1/4	12TW SS	48	32	TC	PVC	EPOXY	105	P85B
T1403/A3	2	1/8	.109	1-1/4	12TW SS	48	32	TC	PVC	EPOXY	105	P85D
T1403/B1	1	—	.109	1-1/4	12TW SS	48	30	SPC	TFE	EPOXY	200	P85B
T1403/B2	2	1/16	.109	1-1/4	12TW SS	48	30	SPC	TFE	EPOXY	200	P85B
T1403/B3	2	1/8	.109	1-1/4	12TW SS	48	30	SPC	TFE	EPOXY	200	P85D
T1404/A1	1	—	.125	1-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100B FP's
T1404/A2	2	1/16	.125	1-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100B FP's
T1404/A3	2	1/8	.125	1-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100D FP's
T1404/B1	1	—	.125	1-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100B FP's
T1404/B2	2	1/16	.125	1-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100B FP's
T1404/B3	2	1/8	.125	1-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100D FP's
T1405/A1	1	—	.156	1-1/2	5/32" SS	48	24	TC	PVC	EPOXY	105	P100B FP's
T1405/A2	2	1/16	.156	1-1/2	5/32" SS	48	24	TC	PVC	EPOXY	105	P100B FP's
T1405/A3	2	1/8	.156	1-1/2	5/32" SS	48	24	TC	PVC	EPOXY	105	P100D FP's
T1405/B1	1	—	.156	1-1/2	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100B FP's
T1405/B2	2	1/16	.156	1-1/2	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100B FP's
T1405/B3	2	1/8	.156	1-1/2	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100D FP's
T1406/A1	1	—	.187	2	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1406/A2	2	1/16	.187	2	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1406/A3	2	1/8	.187	2	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1406/B1	1	—	.187	2	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1406/B2	2	1/16	.187	2	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1406/B3	2	1/8	.187	2	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1407/A1	1	—	.250	2	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1407/A2	2	1/16	.250	2	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1407/A3	2	1/8	.250	2	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1407/B1	1	—	.250	2	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1407/B2	2	1/16	.250	2	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1407/B3	2	1/8	.250	2	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1408/A1	1	—	.187	1-1/2	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1408/A2	2	1/16	.187	1-1/2	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1408/A3	2	1/8	.187	1-1/2	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1409/A1	1	—	.250	2	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1409/A2	2	1/16	.250	2	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1409/A3	2	1/8	.250	2	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1400	1	a/r	.072	a/r	SS304	a/r	18	OFHC	PVC	EPOXY	60	P60
SERIES	2		to		BRASS		20	BC	TEFLON (TFE)	RTV	80	P65
OPTIONS			.250		ALUMINUM		22	TC	TEFLON (FEP)	CERAMIC	105	P85
							24	SPC	KYNAR		125	P100
							26	NPC	FIBERGLASS		175	
							28	Ni	SIL. RUBBER		200	HTP's
							30		KAPTON		260	CTP's
							32		POLYETHYLENE		300	SP's
												FP's
												CTFP's

SERIES T1500

STYLE: A series T1500 assembly consists of a large bead, chip or large probe thermistor attached to insulated hook up wire and encapsulated into a closed end metal tubing. The tube material is generally stainless steel and is closed in one of three basic tip shapes. Aluminum, brass and other metals are available as well as different tip closures. The insulated hook up wires range in size from 18 to 32 gauge with various alloys and insulation materials.

APPLICATION: The series T1500 assemblies are extremely rugged, medium to large size sensor packages with good thermal response times. They are low cost and can be used as is for many general temperature measurement, compensation or control applications. They are particularly well suited for immersion applications involving conductive or corrosive fluids and they provide maximum protection for the thermistor in harsh environments. The assemblies may be immersed up to almost the end of the tubing and with some modifications or further assembly they can be fully immersible over the tube. Please consult the factory for specific information regarding materials selection when conductive or corrosive fluids are involved.

FIGURE 1 (SPHERICAL POINT)

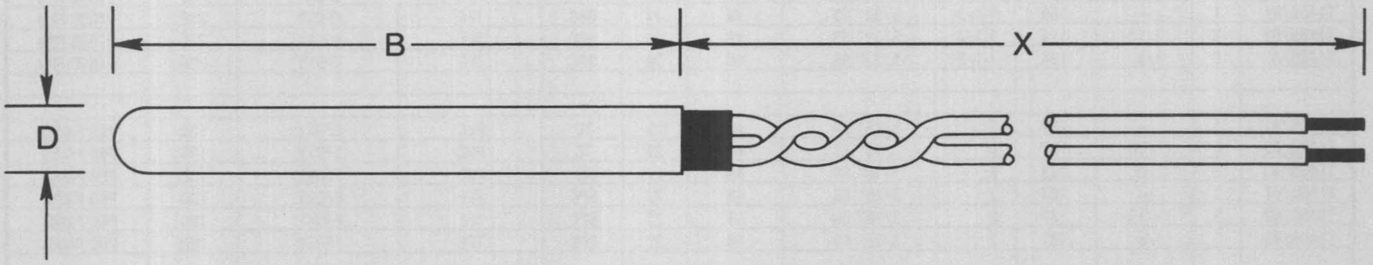


FIGURE 2 (FLAT, PLUG WELDED POINT)

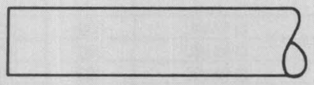
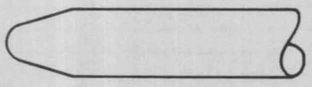


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

808 U.S. HIGHWAY #1• EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

		TUBING			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP. °C	RECOMMENDED THERMISTOR
T1501/A1	1	.072	2	15 SS	48	30	OFHC	KYNAR	EPOXY	125	BR32 B35
T1501/A2	2	.072	2	15 SS	48	30	OFHC	KYNAR	EPOXY	125	BR32 B35
T1501/A3	3	.072	2	15 SS	48	30	OFHC	KYNAR	EPOXY	125	BR32 B35
T1502/A1	1	.083	2	14 SS	48	30	OFHC	KYNAR	EPOXY	125	BR42 P60
T1502/A2	2	.083	2	14 SS	48	30	OFHC	KYNAR	EPOXY	125	BR42 P60
T1502/A3	3	.083	2	14 SS	48	30	OFHC	KYNAR	EPOXY	125	BR42 P60
T1502/B1	1	.083	2	14 SS	48	32	SPC	TFE	EPOXY	200	BR42 P60
T1502/B2	2	.083	2	14 SS	48	32	SPC	TFE	EPOXY	200	BR42 P60
T1502/B3	3	.083	2	14 SS	48	32	SPC	TFE	EPOXY	200	BR42 P60
T1503/A1	1	.095	2	13 SS	48	30	OFHC	KYNAR	EPOXY	125	BR55 P65
T1503/A2	2	.095	2	13 SS	48	30	OFHC	KYNAR	EPOXY	125	BR55 P65
T1503/A3	3	.095	2	13 SS	48	30	OFHC	KYNAR	EPOXY	125	BR55 P65
T1503/B1	1	.095	2	13 SS	48	30	SPC	TFE	EPOXY	200	BR55 P65
T1503/B2	2	.095	2	13 SS	48	30	SPC	TFE	EPOXY	200	BR55 P65
T1503/B3	3	.095	2	13 SS	48	30	SPC	TFE	EPOXY	200	BR55 P65
T1504/A1	1	.109	2-1/2	12TW SS	48	32	TC	PVC	EPOXY	105	P85
T1504/A2	2	.109	2-1/2	12TW SS	48	32	TC	PVC	EPOXY	105	P85
T1504/A3	3	.109	2-1/2	12TW SS	48	32	TC	PVC	EPOXY	105	P85
T1504/B1	1	.109	2-1/2	12TW SS	48	30	SPC	TFE	EPOXY	200	P85
T1504/B2	2	.109	2-1/2	12TW SS	48	30	SPC	TFE	EPOXY	200	P85
T1504/B3	3	.109	2-1/2	12TW SS	48	30	SPC	TFE	EPOXY	200	P85
T1505/A1	1	.125	2-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100 DC95
T1505/A2	2	.125	2-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100 DC95
T1505/A3	3	.125	2-1/2	1/8" SS	48	28	TC	PVC	EPOXY	105	P100 DC95
T1505/B1	1	.125	2-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100
T1505/B2	2	.125	2-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100
T1505/B3	3	.125	2-1/2	1/8" SS	48	28	SPC	TFE	EPOXY	200	P100
T1506/A1	1	.156	3	5/32" SS	48	24	TC	PVC	EPOXY	105	P100 DC95
T1506/A2	2	.156	3	5/32" SS	48	24	TC	PVC	EPOXY	105	P100 DC95
T1506/A3	3	.156	3	5/32" SS	48	24	TC	PVC	EPOXY	105	P100 DC95
T1506/B1	1	.156	3	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100
T1506/B2	2	.156	3	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100
T1506/B3	3	.156	3	5/32" SS	48	24	SPC	TFE	EPOXY	200	P100
T1507/A1	1	.187	3	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1507/A2	2	.187	3	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1507/A3	3	.187	3	3/16" SS	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T1507/B1	1	.187	3	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1507/B2	2	.187	3	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1507/B3	3	.187	3	3/16" SS	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T1508/A1	1	.250	4	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1508/A2	2	.250	4	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1508/A3	3	.250	4	1/4" SS	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T1508/B1	1	.250	4	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1508/B2	2	.250	4	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1508/B3	3	.250	4	1/4" SS	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T1509/A1	1	.187	3	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1509/A2	2	.187	3	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1509/A3	3	.187	3	3/16" SS	48	26	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1510/A1	1	.250	4	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1510/A2	2	.250	4	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
T1510/A3	3	.250	4	1/4" SS	48	22	Ni	FIBERGLASS	CERAMIC	300	HTP's
											BR32 B35
T/1500	1	.072	a/r	SS304	a/r	18	OFHC	PVC	EPOXY	60	BR42 B43
SERIES	2	to		BRASS		20	BC	TELFON (TFE)	RTV	80	BR55
OPTIONS	3	.250		ALUMINUM		22	TC	TEFLON (FEP)	CERAMIC	105	
						24	SPC	KYNAR		125	P60
						26	NPC	FIBERGLASS		175	P65
						28	Ni	SIL. RUBBER		200	P85
						30		KAPTON		260	P100
						32		POLYETHYLENE		300	
											MC50
											DC95
											HTP's
											CTP's
											SP's

SERIES T1600

STYLE: A series T1600 assembly consists of a large bead, chip or large probe thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end metal tubing. The tubing material is generally stainless steel and ranges in size from ⅛" to ¼" diameter, although aluminum, brass or other materials may be specified. The thermistor may be completely encapsulated for maximum protection or it may be exposed for fast response.

APPLICATION: The series T1600 assemblies are extremely rugged, medium to large size sensor packages with good response times. The assemblies are suitable for many general temperature measurment or control applications where a shielded cable must be used to protect against interference. The exposed probe tip designs are suitable for limited immersion in non-conductive fluids and may be altered or modified for use in conductive or corrosive fluids. Please consult the factory for specific information regarding material selection in applications where conductive or corrosive fluids are involved.

FIGURE 1

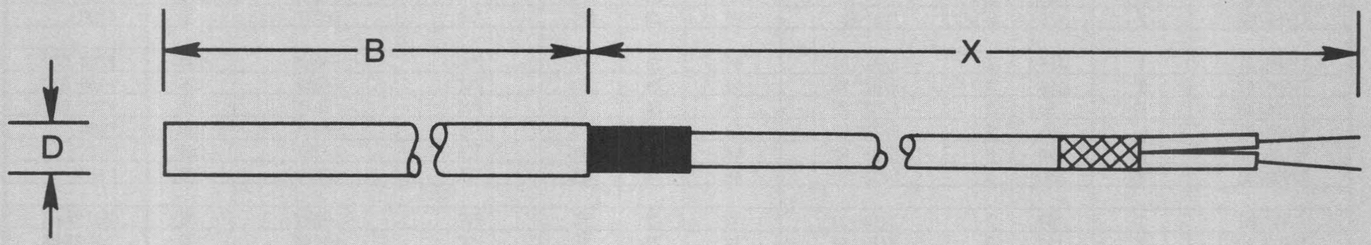
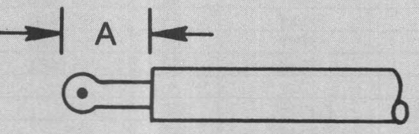


FIGURE 2



EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:

20 28
22 30
24 32
26

CONSTRUCTION:

RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

THERMOMETRICS INC.

		TIP	TUBING			SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIA "A"	DIA. "D"	LENGTH "B"	MATERIAL	LENGTH "X"	# COND.	GA.	ALLOY	INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T1601/A1	1	—	.125	2-1/2	1/8 DIA. SS	48	RG	26	BCW	PE/PVC	EPOXY	60	BR55, P60
T1602/A2	2	1/8	.125	2-1/2	1/8 DIA. SS	48	RG	26	BCW	PE/PVC	EPOXY	60	P60, P65
T1601/B1	1	—	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	TC	PVC/PVC	EPOXY	105	P60, DC95
T1601/B2	2	1/8	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	TC	PVC/PVC	EPOXY	105	P60, P85
T1601/C1	1	—	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	SPC	TFE/TFE	EPOXY	200	P60, P85
T1601/C2	2	1/8	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	SPC	TFE/TFE	EPOXY	200	P60, P85
T1602/A1	1	—	.156	3	5/32 DIA. SS	48	1 + S	24	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/A2	2	1/8	.156	3	5/32 DIA. SS	48	1 + S	24	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/B1	1	—	.156	3	5/32 DIA. SS	48	1 + S	24	SPC	TFE/TFE	EPOXY	200	P85, P100
T1602/B2	2	1/8	.156	3	5/32 DIA. SS	48	1 + S	24	SPC	TFE/TFE	EPOXY	200	P85, P100
T1602/C1	1	—	.156	3	5/32 DIA. SS	48	2	30	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/C2	2	1/8	.156	3	5/32 DIA. SS	48	2	30	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/D1	1	—	.156	3	5/32 DIA. SS	48	2	30	SPC	TFE/TFE	EPOXY	200	P85, P100
T1602/D2	2	1/8	.156	3	5/32 DIA. SS	48	2	30	SPC	TFE/TFE	EPOXY	200	P85, P100
T1602/E1	1	—	.156	3	5/32 DIA. SS	48	4	32	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/E2	2	1/8	.156	3	5/32 DIA. SS	48	4	32	TC	PVC/PVC	EPOXY	105	P85, P100
T1602/F1	1	—	.156	3	5/32 DIA. SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P85, P100
T1602/F2	2	1/8	.156	3	5/32 DIA. SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P85, P100
T1603/A1	1	—	.187	4	3/16 DIA. SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/A2	2	1/8	.187	4	3/16 DIA. SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/B1	1	—	.187	4	3/16 DIA. SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1603/B2	2	1/8	.187	4	3/16 DIA. SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1603/C1	1	—	.187	4	3/16 DIA. SS	48	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/C2	2	1/8	.187	4	3/16 DIA. SS	48	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/D1	1	—	.187	4	3/16 DIA. SS	48	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1603/D2	2	1/8	.187	4	3/16 DIA. SS	48	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1603/E1	1	—	.187	4	3/16 DIA. SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/E2	2	1/8	.187	4	3/16 DIA. SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1603/F1	1	—	.187	4	3/16 DIA. SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1603/F2	2	1/8	.187	4	3/16 DIA. SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1604/A1	1	—	.250	6	1/4 DIA. SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/A2	2	1/8	.250	6	1/4 DIA. SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/B1	1	—	.250	6	1/4 DIA. SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1604/B2	2	1/8	.250	6	1/4 DIA. SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1604/C1	1	—	.250	6	1/4 DIA. SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/C2	2	1/8	.250	6	1/4 DIA. SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/D1	1	—	.250	6	1/4 DIA. SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1604/D2	2	1/8	.250	6	1/4 DIA. SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1604/E1	1	—	.250	6	1/4 DIA. SS	48	4	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/E2	2	1/8	.250	6	1/4 DIA. SS	48	4	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1604/F1	1	—	.250	6	1/4 DIA. SS	48	4	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1604/F2	2	1/8	.250	6	1/4 DIA. SS	48	4	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
												60	BR32
													BR42
T1600	1	a/r	1/8	a/r	SS304	a/r	1 + S	20	BC	PVC	EPOXY	80	BR55
SERIES	2		to		BRASS		2	22	TC	TEFLON (TFE)	RTV	105	
OPTIONS					ALUMINUM		3	24	SPC	TEFLON (FEP)		175	P60
			1/4				4	26	NPC	POLYETHYLENE		200	P65
								28	SCCW	SIL. RUBBER		260	P85
							RG	30	BCW	NEOPRENE			P100
								32					MC50
													DC95
													FP's
													CTP's
													SP's

ALLOYS:		INSULATIONS:	
	BARE COPPER		TEFLON - TFE
	COPPERWELD		TEFLON - FEP
	TINNED COPPER		POLYVINYL CHLORIDE - PVC
	SILVER PLATED COPPER		POLYETHYLENE
	NICKEL PLATED COPPER		POLYPROPYLENE
	SILVER CLAD COPPERWELD		NEOPRENE
			SILICONE RUBBER
			FIBERGLASS

SERIES T1700

STYLE: A series T1700 assembly consists of a large bead, chip or large probe thermistor attached to coaxial or multiconductor shielded and insulated cable and encapsulated into a closed end metal tubing. The tube material is generally stainless steel, however, aluminum, brass or other metals are available.The tip is closed in one of three basic shapes with other closures available on special order.

APPLICATION: The series T1700 assemblies are extremely rugged, medium to large size sensor packages with good thermal response times. The assemblies are suitable for many general temperature measurement or control applications where a shielded cable must be used to protect against interference. The closed end tubing provides maximum protection for the thermistor in harsh environments including immersion in conductive or corrosive fluids up to almost the end of the tubing. With some modification or further assembly they can be fully immersed over the tubing. Please consult the factory for specific information regarding materials selection for application involving conductive or corrosive fluids.

FIGURE 1 (SPHERICAL POINT)

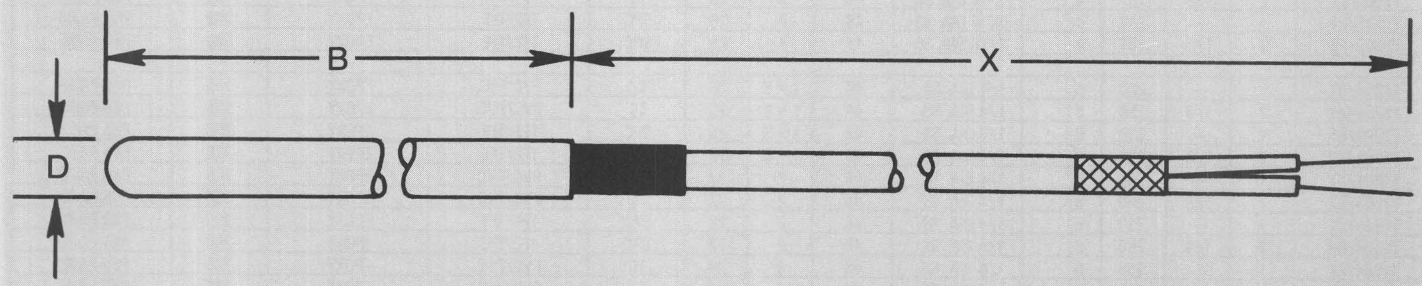


FIGURE 2 (FLAT, PLUG WELDED POINT)

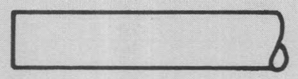
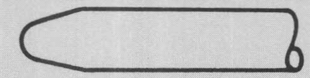


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING DIA "D"	 LENGTH "B"	 MATERIAL	SHIELDED / JACKETED CABLE LENGTH "X"	 # COND.	 GA	 ALLOY	 INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T1701/A1	1	.125	2-1/2	1/8 DIA. SS	48	RG	26	BCW	PE/PVC	EPOXY	60	DC95
T1701/A2	2	.125	2-1/2	1/8 DIA. SS	48	RG	26	BCW	PE/PVC	EPOXY	60	DC95
T1701/A3	3	.125	2-1/2	1/8 DIA. SS	48	RG	26	BCW	PE/PVC	EPOXY	60	DC95
T1701/B1	1	.125	2-1/2	1/8 DIA. SS	48	RG	30	SCCW	TFE/FEP	EPOXY	200	BR55 P60
T1701/B2	2	.125	2-1/2	1/8 DIA. SS	48	RG	30	SCCW	TFE/FEP	EPOXY	200	BR55 P60
T1701/B3	3	.125	2-1/2	1/8 DIA. SS	48	RG	30	SCCW	TFE/FEP	EPOXY	200	BR55 P60
T1701/C1	1	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	TC	PVC/PVC	EPOXY	105	P60 P85
T1701/C2	2	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	TC	PVC/PVC	EPOXY	105	P60 P85
T1701/C3	3	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	TC	PVC/PVC	EPOXY	105	P60 P85
T1701/D1	1	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	SPC	TFE/TFE	EPOXY	200	P60 P85
T1701/D2	2	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	SPC	TFE/TFE	EPOXY	200	P60 P85
T1701/D3	3	.125	2-1/2	1/8 DIA. SS	48	1 + S	26	SPC	TFE/TFE	EPOXY	200	P60 P85
T1702/A1	1	.156	3	5/32 DIA. SS	48	1 + S	24	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/A2	2	.156	3	5/32 DIA. SS	48	1 + S	24	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/A3	3	.156	3	5/32 DIA. SS	48	1 + S	24	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/B1	1	.156	3	5/32 DIA. SS	48	1 + S	24	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/B2	2	.156	3	5/32 DIA. SS	48	1 + S	24	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/B3	3	.156	3	5/32 DIA. SS	48	1 + S	24	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/C1	1	.156	3	5/32 DIA. SS	48	2	30	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/C2	2	.156	3	5/32 DIA. SS	48	2	30	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/C3	3	.156	3	5/32 DIA. SS	48	2	30	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/D1	1	.156	3	5/32 DIA. SS	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/D2	2	.156	3	5/32 DIA. SS	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/D3	3	.156	3	5/32 DIA. SS	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/E1	1	.156	3	5/32 DIA. SS	48	4	32	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/E2	2	.156	3	5/32 DIA. SS	48	4	32	TC	PVC/PVC	EPOXY	105	P85 P100
T1702/E3	3	.156	3	5/32 DIA. SS	48	4	32	TC	PVC/PVC	EPOXY	105	P85 P100
T1701/F1	1	.156	3	5/32 DIA. SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/F2	2	.156	3	5/32 DIA. SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1702/F3	3	.156	3	5/32 DIA. SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P85 P100
T1703/A1	1	.187	4	3/16 DIA. SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/A2	2	.187	4	3/16 DIA. SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/A3	3	.187	4	3/16 DIA. SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/B1	1	.187	4	3/16 DIA. SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/B2	2	.187	4	3/16 DIA. SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/B3	3	.187	4	3/16 DIA. SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/C1	1	.187	4	3/16 DIA. SS	48	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/C2	2	.187	4	3/16 DIA. SS	48	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/C3	3	.187	4	3/16 DIA. SS	48	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/D1	1	.187	4	3/16 DIA. SS	48	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/D2	2	.187	4	3/16 DIA. SS	48	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/D3	3	.187	4	3/16 DIA. SS	48	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/E1	1	.187	4	3/16 DIA. SS	48	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/E2	2	.187	4	3/16 DIA. SS	48	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/E3	3	.187	4	3/16 DIA. SS	48	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T1703/F1	1	.187	4	3/16 DIA. SS	48	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/F2	2	.187	4	3/16 DIA. SS	48	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1703/F3	3	.187	4	3/16 DIA. SS	48	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T1704/A1	1	.250	6	1/4 DIA. SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/A2	2	.250	6	1/4 DIA. SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/A3	3	.250	6	1/4 DIA. SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/B1	1	.250	6	1/4 DIA. SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/B2	2	.250	6	1/4 DIA. SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/B3	3	.250	6	1/4 DIA. SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/C1	1	.250	6	1/4 DIA. SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/C2	2	.250	6	1/4 DIA. SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/C3	3	.250	6	1/4 DIA. SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/D1	1	.250	6	1/4 DIA. SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/D2	2	.250	6	1/4 DIA. SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/D3	3	.250	6	1/4 DIA. SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/E1	1	.250	6	1/4 DIA. SS	48	4	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/E2	2	.250	6	1/4 DIA. SS	48	4	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/E3	3	.250	6	1/4 DIA. SS	48	4	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T1704/F1	1	.250	6	1/4 DIA. SS	48	4	24	SPC	TEF/TFE	EPOXY	200	P85 PAIRS
T1704/F2	2	.250	6	1/4 DIA. SS	48	4	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T1704/F3	3	.250	6	1/4 DIA. SS	48	4	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS

ASSEMBLY PREFIX	FIG.	TUBING			SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA "D"	LENGTH "B"	MATERIAL	LENGTH "X"	# COND.	GA	ALLOY	INSUL./JKT.			
												BR32
											60	BR42
T1700	1	1/8	a/r	SS304	a/r	1 + S	20	TC	PVC	EPOXY	80	BR55
SERIES	2	to		BRASS		2	22	BC	TEFLON (TFE)	RTV	105	
OPTIONS	3	—		ALUMINUM		3	24	SPC	TEFLON (FEP)		175	P60
		1/4				4	26	NPC	POLYETHYLENE		200	P65
							28	SCCW	SIL. RUBBER		260	P85
						RG	30	BCW	NEOPRENE			P100
							32					MC50
												DC95
												CTP's
												SP's

TUBING: STAINLESS STEEL

The most versatile and useful metal tubing in the Sensor Handbook is stainless steel. Tubing is available in hypodermic gauge sizes from #6 (.203"O.D.) to #25 (.020"O.D.) in alloy T304. Standard fractional tubing (ASTM A269) and close tolerance fractional tubing (ASTM A632) is available in alloys 304 or 316 as seamless or welded stock. Other series 300 or 400 alloys, special wall sizes and metric sizes can be specified for custom assemblies. The basic sizes most commonly used in the Sensor Handbook are listed in the following table.

SIZE	O.D. (REF.)	I.D. (REF.)
#24xx	.022	.016
#22TW	.028	.020
1/32"	.0313	.0193
#21TW	.032	.022
#20TW	.0355	.0255
#19TW	.0425	.0325
#18TW	.050	.042
#17TW	.059	.046
1/16"	.0625	.0465
#16	.065	.047
#15	.072	.054
#14	.083	.063
3/32"	.0938	.0638
#13	.095	.071
#12TW	.109	.091
#11	.120	.094
1/8"	.125	.105
#10	.134	.106
#9	.148	.118
5/32"	.1563	.1243
#8	.165	.135
#7	.180	.150
3/16"	.1875	.1555
#6	.203	.173
7/32"	.2188	.1868
1/4"	.250	.210

TUBING: ALUMINUM

Aluminum tubing is available in diameters of 1/8", 3/16" and 1/4" with standard wall thicknesses from .020" to .035". The most commonly specified alloy is D6061-T6, however, other alloys may be available on special order. The basic sizes of alloy D6061-T6 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/8) .125	.085	.020
(3/16) .1875	.1435	.022
(1/4) .250	.194	.028

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:

20
22
24
26
28
30
32

CONSTRUCTION:

RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:

BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

INSULATIONS:

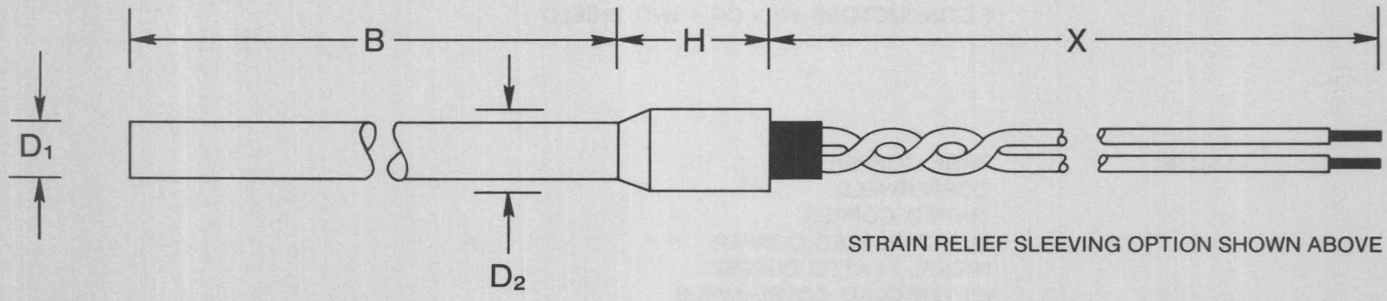
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

SERIES T2000

STYLE: A series T2000 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to insulated hook up wires and encapsulated into a open end tubing. The tubing has a swaged transition hub which permits the use of heavier gauge extension leads. The standard assemblies are made of stainless steel, however, brass or other metals may be specified. The thermistor may be completely encapsulated for maximum protection or may be partially exposed at the tip for fast response.

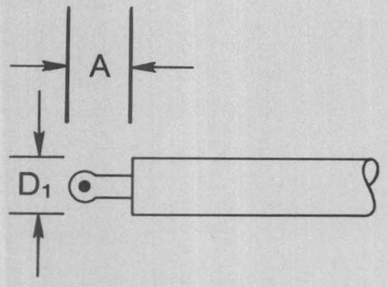
APPLICATION: The series T2000 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies and the ease of handling of the hook up wire terminations. This is accomplished by making a strain relieved splice connection to the larger hook up wire gauge sizes within the transition hub. The assemblies may be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for such applications.

FIGURE 1

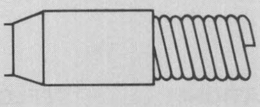


STRAIN RELIEF SLEEVING OPTION SHOWN ABOVE

FIGURE 2



STRAIN RELIEF SPRING OPTION AVAILABLE



(SPRING AVAILABLE ONLY FOR HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

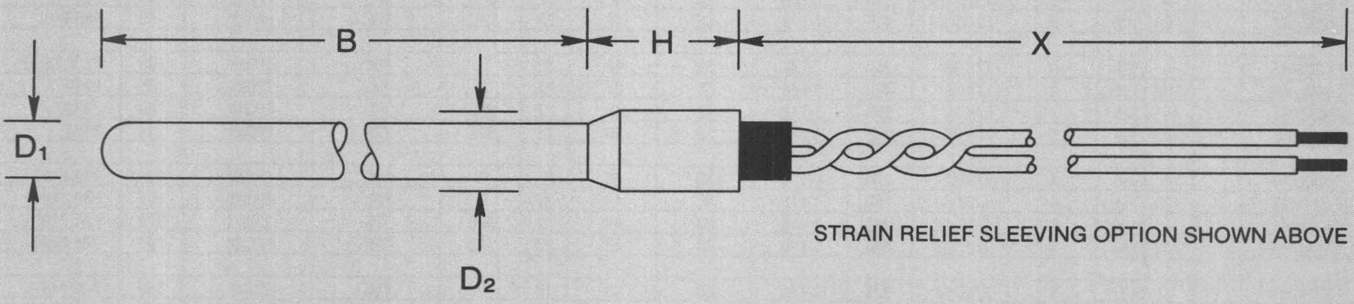
		TIP	TUBING			HUB (SWAGED)			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "A"	DIA "D_1"	LENGTH "B"	MAT'L	DIA. "D_2"	LENGTH "H"	MT'L	LENGTH "X"	GA	ALLOY	INSUL.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T2001/A1	1	—	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P20 BR16
T2001/A2	2	.030	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P20
T2001/B1	1	—	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P20 BR16
T2001/B2	2	.030	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P20
T2002/A1	1	—	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P25 BR23
T2002/A2	2	.035	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P25
T2002/B1	1	—	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P25 BR23
T2002/B2	2	.035	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P25
T2003/A1	1	—	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P30 BR32
T2003/A2	2	.040	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P30
T2003/B1	1	—	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P30 BR32
T2003/B2	2	.040	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P30
T2004/A1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	BR42 MC50
T2004/A2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60
T2004/B1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	BR42
T2004/B2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60
T2005/A1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 BR55
T2005/A2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P65
T2005/B1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 BR55
T2005/B2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P65
T2006/A1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 P65
T2006/A2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 P65
T2006/B1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 P65
T2006/B2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 P65
T2007/A1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	22	TC	PVC	EPOYX	105	P85
T2007/A2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 FP's
T2007/B1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85
T2007/B2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 FP's
T2008/A1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2008/A2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P100
T2008/B1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P100
T2008/B2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P100
T2009/A1	1	—	.156	4	5/32 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 P100
T2009/A2	2	.125	.156	4	5/32 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 P100
T2009/B1	1	—	.156	4	5/32 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 P100
T2009/B2	2	.125	.156	4	5/32 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 P100
T2010/A1	1	—	.187	6	3/16 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P60 PAIRS
T2010/A2	2	.125	.187	6	3/16 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P60 PAIRS
T2010/B1	1	—	.187	6	3/16 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P60 PAIRS
T2010/B2	2	.125	.187	6	3/16 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P60 PAIRS
T2011/A1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P85 PAIRS
T2011/A2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P85 PAIRS
T2011/B1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P85 PAIRS
T2011/B2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P85 PAIRS
T2000	1	a/r	.0355	a/r	SS304	.125	a/r	SS304	a/r	32	BC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS	to		BRASS		30	TC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250			.500				28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
										26	NPC	KYNAR		125	BR42
										24	OFHC	FIBERGLASS		175	BR55
										22	Ni	SIL. RUBBER		200	
										20		KAPTON		260	MC50
										18		POLYETHYLENE		300	DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															FP's
															CTP's
															HTP's

SERIES T2100

STYLE: A series T2100 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to insulated hook up wires and encapsulated into a closed end tubing. The tubing has a swaged transition hub which permits the use of heavier gauge extension leads. The standard assemblies are made of stainless steel, however, brass or other materials may be specified. The housing is closed in one of three basic shapes with other closures available on special order.

APPLICATION: The series T2100 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies and the ease of handling of the hook up wire terminations. This is accomplished by making a strain relieved splice connection in the transition hub. The closed end tubing provides maximum protection for the thermistor in harsh environments. The assemblies are well suited for immersion in corrosive or conductive fluids up to the transition hub and with some modifications they may be fully immersed over the hub. Please consult the factory for specific information regarding materials selection for such applications.

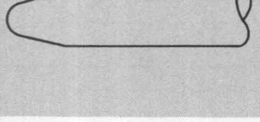
FIGURE 1 (SPHERICAL POINT)



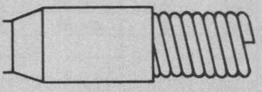
STRAIN RELIEF SLEEVING OPTION SHOWN ABOVE

FIGURE 2 (FLAT, PLUG WELDED POINT)

FIGURE 3 (TAPERED POINT)



STRAIN RELIEF SPRING OPTION AVAILABLE



(SPRING AVAILABLE ONLY FOR HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

THERMOMETRICS INC.

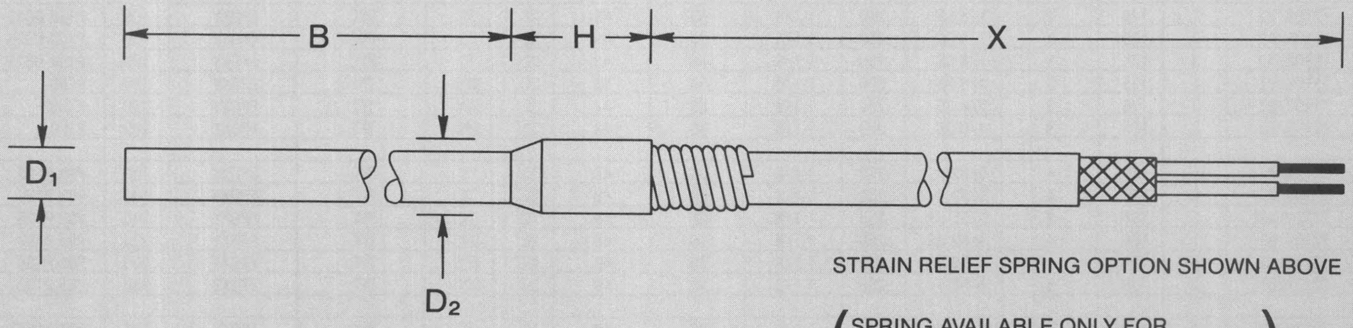
ASSEMBLY PREFIX	FIG.	TUBING			HUB (SWAGED)			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA. "D_1"	LENGTH "B"	MT'L	DIA. "D_2"	LENGTH "H"	MT'L	LENGTH "X"	GA	ALLOY	INSUL.			
T2101/A1	1	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P20 BR16
T2101/B1	1	.0355	2-1/4	20TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P20 BR16
T2102/A1	1	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P25 BR23
T2102/B1	1	.0425	2-1/4	19TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P25 BR23
T2103/A1	1	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P30 BR32
T2103/A2	2	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	TC	PVC	EPOXY	105	P30 BR32
T2103/B1	1	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P30 BR32
T2103/B2	2	.050	2-1/4	18TW SS	.125	3/4	SS	48	32	SPC	TFE	EPOXY	200	P30 BR32
T2104/A1	1	.072	2-1/2	15 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	BR42 MC50
T2104/A2	2	.072	2-1/2	15 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	BR42 MC50
T2104/B1	1	.072	2-1/2	15 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	BR42
T2104/B2	2	.072	2-1/2	15 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	BR42
T2105/A1	1	.083	2-1/2	14 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 BR55
T2105/A2	2	.083	2-1/2	14 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 BR55
T2105/B1	1	.083	2-1/2	14 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 BR55
T2105/B2	2	.083	2-1/2	14 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 BR55
T2106/A1	1	.095	2-1/2	13 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 P65
T2106/A2	2	.095	2-1/2	13 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 P65
T2106/A3	3	.095	2-1/2	13 SS	.187	1	SS	48	26	TC	PVC	EPOXY	105	P60 P65
T2106/B1	1	.095	2-1/2	13 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 P65
T2106/B2	2	.095	2-1/2	13 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 P65
T2106/B3	3	.095	2-1/2	13 SS	.187	1	SS	48	26	SPC	TFE	EPOXY	200	P60 P65
T2107/A1	1	.109	3	12TW SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85
T2107/A2	2	.109	3	12TW SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85
T2107/A3	3	.109	3	12TW SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85
T2107/B1	1	.109	3	12TW SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85
T2107/B2	2	.109	3	12TW SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85
T2107/B3	3	.109	3	12TW SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85
T2108/A1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2108/A2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2108/A3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2108/B1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P100
T2108/B2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P100
T2108/B3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P100
T2109/A1	1	.156	4	5/32 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 P100
T2109/A2	2	.156	4	5/32 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 P100
T2109/A3	3	.156	4	5/32 SS	.250	1-1/8	SS	48	22	TC	PVC	EPOXY	105	P85 P100
T2109/B1	1	.156	4	5/32 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 P100
T2109/B2	2	.156	4	5/32 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 P100
T2109/B3	3	.156	4	5/32 SS	.250	1-1/8	SS	48	22	SPC	TFE	EPOXY	200	P85 P100
T2110/A1	1	.187	6	3/16 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P60 PAIRS
T2110/A2	2	.187	6	3/16 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P60 PAIRS
T2110/A3	3	.187	6	3/16 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P60 PAIRS
T2110/B1	1	.187	6	3/16 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P60 PAIRS
T2110/B2	2	.187	6	3/16 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P60 PAIRS
T2110/B3	3	.187	6	3/16 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P60 PAIRS
T2111/A1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P85 PAIRS
T2111/A2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P85 PAIRS
T2111/A3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	18	TC	PVC	EPOXY	105	P85 PAIRS
T2111/B1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P85 PAIRS
T2111/B2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P85 PAIRS
T2111/B3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	18	SPC	TFE	EPOXY	200	P85 PAIRS
T2100	1	.0355	a/r	SS304	.125	a/r	SS304	a/r	32	BC	PVC	EPOXY	60	BR16
SERIES	2	to		BRASS	to		BRASS		30	TC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250			.500				28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
									26	NPC	KYNAR		125	BR42
									24	OFHC	FIBERGLASS		175	BR55
									22	Ni	SIL. RUBBER		200	
									20		KAPTON		260	MC50
									18		POLYETHYLENE		300	DC95
														P20
														P25
														P30
														P60
														P65
														P85
														P100
														SP's
														CTP's
														HTP's

SERIES T2200

STYLE: A series T2200 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated thermistor attached to a coaxial or multiconductor shielded and insulated cable, and encapsulated into an open end metal tubing. The tubing is generally stainless steel, although brass or other metals may be specified, and the tubing has a swaged transition hub. The thermistor may be completely encapsulated for maximum protection or may be partially exposed at the tip for fast response.

APPLICATION: The series T2200 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies with the ease of handling and interference protection of the shielded cable terminations. This is accomplished by making a strain relieved splice connection to the shielded cable within the transition hub. These assemblies may be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion inconductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for such applications.

FIGURE 1

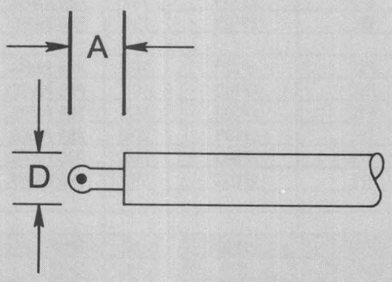


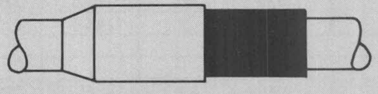
STRAIN RELIEF SPRING OPTION SHOWN ABOVE

(SPRING AVAILABLE ONLY FOR HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

FIGURE 2





STRAIN RELIEF SLEEVING OPTION AVAILABLE

THERMOMETRICS INC.

		TIP	TUBING			HUB (SWAGED)			SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA "D_1"	LENGTH "B"	MT'L	DIA. "D_2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T2201/A1	1	—	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P20 BR16
T2201/A2	2	.030	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P20
T2201/B1	1	—	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2201/B2	2	.030	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P20
T2202/A1	1	—	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P25 BR23
T2202/A2	2	.035	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P25
T2202/B1	1	—	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2202/B2	2	.035	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P25
T2203/A1	1	—	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P30 BR32
T2203/A2	2	.040	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P30
T2203/B1	1	—	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2203/B2	2	.040	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P30
T2204/A1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2204/A2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60
T2204/B1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2204/B2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60
T2204/C1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2204/C2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60
T2204/D1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2204/D2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60
T2204/E1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2204/E2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60
T2204/F1	1	—	.072	2-1/2	15 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2204/F2	2	.100	.072	2-1/2	15 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60
T2205/A1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2205/A2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2205/B1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2205/B2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2205/C1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 BR55
T2205/C2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 P65
T2205/D1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2205/D2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 P65
T2205/E1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 BR55
T2205/E2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 P65
T2205/F1	1	—	.083	2-1/2	14 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2205/F2	2	.100	.083	2-1/2	14 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/A1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/A2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/B1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/B2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/C1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/C2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/D1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/D2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/E1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/E2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 P65
T2206/F1	1	—	.095	2-1/2	13 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T2206/F2	2	.100	.095	2-1/2	13 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T2207/A1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85
T2207/A2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85 FP's
T2207/B1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85
T2207/B2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85 FP's
T2207/C1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2207/C2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T2207/D1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2207/D2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T2207/E1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2207/E2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85 FP's
T2207/F1	1	—	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2207/F2	2	.100	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85 FP's

		TIP	TUBING			HUB (SWAGED)			SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA "D1"	LENGTH "B"	MT'L	DIA. "D2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T2208/A1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P100 DC95
T2208/A2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P100
T2208/B1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P100
T2208/B2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P100
T2208/C1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2208/C2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T2208/D1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2208/D2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2208/E1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2208/E2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100
T2208/F1	1	—	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2208/F2	2	.100	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2209/A1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/A2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/B1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2209/B2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2209/C1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/C2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/D1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2209/D2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2209/E1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/E2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	TC	PVC/PVC	EPOXY	105	PAIRS
T2209/F1	1	—	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	SPC	TFE/TFE	EPOXY	200	PAIRS
T2209/F2	2	.125	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	SPC	TFE/TFE	EPOXY	200	PAIRS
T2200	1	a/r	.0355	a/r	SS304	.125	a/r	SS304	a/r	1 + S	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS	to		BRASS		2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250			.500				3	28	SPC	TEFLON (FEP)		105	BR32
										4	26	NPC	POLYETHYLENE		175	BR42
											24	SCCW	SIL. RUBBER		200	BR55
										RG	22	BCW	NEOPRENE		260	
											20					MC50
																DC95
																P20
																P25
																P30
																P60
																P65
																P85
																P100
																SP's
																FP's
																CTP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

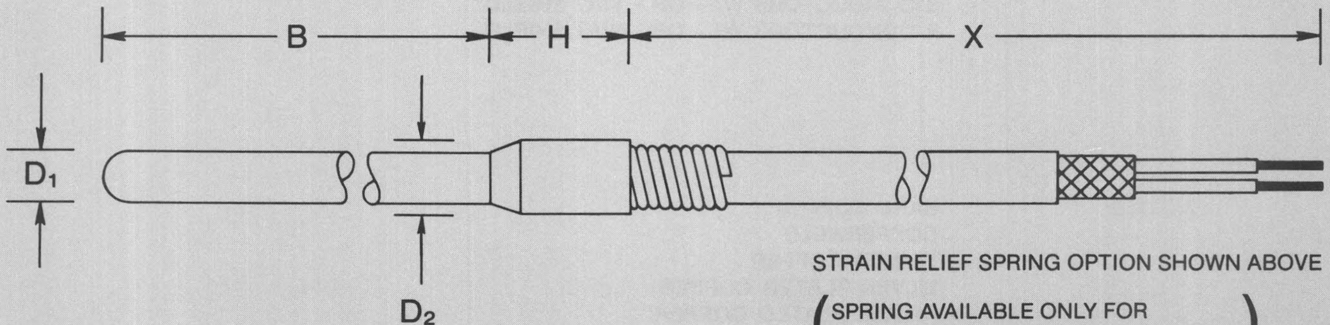
GAUGE SIZES:	20 22 24 26 28 30 32
CONSTRUCTION:	RG CABLE 1 CONDUCTOR + SHIELD 2 CONDUCTORS W/ - OR - W/O SHIELD 3 CONDUCTORS W/ - OR - W/O SHIELD 4 CONDUCTORS W/ - OR - W/O SHIELD
ALLOYS:	BARE COPPER COPPERWELD TINNED COPPER SILVER PLATED COPPER NICKEL PLATED COPPER SILVER CLAD COPPERWELD
INSULATIONS:	TEFLON - TFE TEFLON - FEP POLYVINYL CHLORIDE - PVC POLYETHYLENE POLYPROPYLENE NEOPRENE SILICONE RUBBER FIBERGLASS

SERIES T2300

STYLE: A series T2300 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to a coaxial or multiconductor shielded and insulated cable, and encapsulated into a closed end metal tubing. The tubing is generally stainless steel, although brass or other metals may be specified, and the tubing has a swaged transition hub. The tubing is closed in one of three basic shapes with other closures available on special order.

APPLICATION: The series T2300 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies with the ease of handling and interference protection of the shielded cable terminations. This is accomplished by making a strain relieved splice connection to the shielded cable within the transition hub. The closed end tubing provides maximum protection for the thermistor in harsh environments. The assemblies are well suited for immersion in corrosive or conductive fluids up to the transition hub and with some modifications they may be fully immersed over the hub. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1 (SPHERICAL POINT)

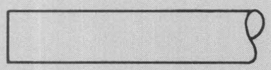


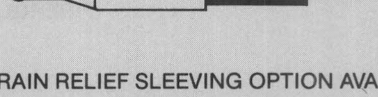
STRAIN RELIEF SPRING OPTION SHOWN ABOVE

(SPRING AVAILABLE ONLY FOR
HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

FIGURE 2 (FLAT, PLUG WELDED POINT)





STRAIN RELIEF SLEEVING OPTION AVAILABLE

FIGURE 3 (TAPERED POINT)

ASSEMBLY PREFIX	FIG.	TUBING			HUB (SWAGED)			SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA "D1"	LENGTH "B"	MT'L	DIA. "D2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.			
T2301/A1	1	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P20 BR16
T2301/B1	1	.0355	2-1/4	20TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2302/A1	1	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P25 BR23
T2302/B1	1	.0425	2-1/4	19TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2303/A1	1	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P30 BR32
T2303/A2	2	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	TC	PVC/PVC	EPOXY	105	P30 BR32
T2303/B1	1	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2303/B2	2	.050	2-1/4	18TW SS	.125	3/4	SS	48	1 + S	28	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2304/A1	1	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/A2	2	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/B1	1	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2304/B2	2	.072	2-1/2	15 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2304/C1	1	.072	2-1/2	15 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/C2	2	.072	2-1/2	15 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/D1	1	.072	2-1/2	15 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2304/D2	2	.072	2-1/2	15 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2304/E1	1	.072	2-1/2	15 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/E2	2	.072	2-1/2	15 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2304/F1	1	.072	2-1/2	15 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2304/F2	2	.072	2-1/2	15 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	BR42 B43
T2305/A1	1	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/A2	2	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/B1	1	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2305/B2	2	.083	2-1/2	14 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2305/C1	1	.083	2-1/2	14 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/C2	2	.083	2-1/2	14 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/D1	1	.083	2-1/2	14 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2305/D2	2	.083	2-1/2	14 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2305/E1	1	.083	2-1/2	14 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/E2	2	.083	2-1/2	14 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P60 BR55
T2305/F1	1	.083	2-1/2	14 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2305/F2	2	.083	2-1/2	14 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2306/A1	1	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P65
T2306/A2	2	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P65
T2306/A3	3	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	TC	PVC/PVC	EPOXY	105	P65
T2306/B1	1	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P65
T2306/B2	2	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P65
T2306/B3	3	.095	2-1/2	13 SS	.187	1	SS	48	1 + S	22	SPC	TFE/TFE	EPOXY	200	P65
T2306/C1	1	.095	2-1/2	13 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P65
T2306/C2	2	.095	2-1/2	13 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P65
T2306/C3	3	.095	2-1/2	13 SS	.187	1	SS	48	2	28	TC	PVC/PVC	EPOXY	105	P65
T2306/D1	1	.095	2-1/2	13 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P65
T2306/D2	2	.095	2-1/2	13 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P65
T2306/D3	3	.095	2-1/2	13 SS	.187	1	SS	48	2	28	SPC	TFE/TFE	EPOXY	200	P65
T2306/E1	1	.095	2-1/2	13 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P65
T2306/E2	2	.095	2-1/2	13 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P65
T2306/E3	3	.095	2-1/2	13 SS	.187	1	SS	48	4	32	TC	PVC/PVC	EPOXY	105	P65
T2306/F1	1	.095	2-1/2	13 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P65
T2306/F2	2	.095	2-1/2	13 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P65
T2306/F3	3	.095	2-1/2	13 SS	.187	1	SS	48	4	30	SPC	TFE/TFE	EPOXY	200	P65
T2307/A1	1	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85
T2307/A2	2	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85
T2307/A3	3	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P85
T2307/B1	1	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85
T2307/B2	2	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85
T2307/B3	3	.109	3	12TW SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P85
T2307/C1	1	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2307/C2	2	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2307/C3	3	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2307/D1	1	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2307/D2	2	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2307/D3	3	.109	3	12TW SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2307/E1	1	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2307/E2	2	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2307/E3	3	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2307/F1	1	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2307/F2	2	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2307/F3	3	.109	3	12TW SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85

		TUBING			HUB (SWAGED)			SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIA "D_1"	LENGTH "B"	MT'L	DIA. "D_2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T2308/A1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/A2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/A3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/B1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	SPC	TEF/TFE	EPOXY	200	P100
T2308/B2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P100
T2308/B3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	P100
T2308/C1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/C2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/C3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/D1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2308/D2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2308/D3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2308/E1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/E2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/E3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2308/F1	1	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2308/F2	2	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2308/F3	3	.125	3	1/8 SS	.250	1-1/8	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2309/A1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/A2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/A3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/B1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/B2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/B3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	1 + S	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/C1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/C2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/C3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/D1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/D2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/D3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	2	20	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/E1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/E2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/E3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	TC	PVC/PVC	EPOXY	105	PAIRS
T2309/F1	1	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/F2	2	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	SPC	TFE/TFE	EPOXY	200	PAIRS
T2309/F3	3	.250	6	1/4 SS	.375	1-1/4	SS	48	4	22	SPC	TFE/TFE	EPOXY	200	PAIRS
T2300	1	.0355	a/r	SS304	.125	a/r	SS304	a/r	1 + S	32	TC	PVC	EPOXY	60	BR16
SERIES	2	to		BRASS	to		BRASS		2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250			.500				3	28	SPC	TEFLON (FEP)		105	BR32
									4	26	NPC	POLYETHYLENE		175	BR42
										24	SCCW	SIL. RUBBER		200	BR55
									RG	22	BCW	NEOPRENE		260	
										20					MC50
															DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															CTP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT

CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

TUBING: STAINLESS STEEL

The most versatile and useful metal tubing in the Sensor Handbook is stainless steel. Tubing is available in hypodermic gauge sizes from #6 (.203"O.D.) to #25 (.020"O.D.) in alloy T304. Standard fractional tubing (ASTM A269) and close tolerance fractional tubing (ASTM A632) is available in alloys 304 or 316 as seamless or welded stock. Other series 300 or 400 alloys, special wall sizes and metric sizes can be specified for custom assemblies. The basic sizes most commonly used in the Sensor Handbook are listed in the following table.

SIZE	O.D. (REF.)	I.D. (REF.)
#24xx	.022	.016
#22TW	.028	.020
1/32"	.0313	.0193
#21TW	.032	.022
#20TW	.0355	.0255
#19TW	.0425	.0325
#18TW	.050	.042
#17TW	.059	.046
1/16"	.0625	.0465
#16	.065	.047
#15	.072	.054
#14	.083	.063
3/32"	.0938	.0638
#13	.095	.071
#12TW	.109	.091
#11	.120	.094
1/8"	.125	.105
#10	.134	.106
#9	.148	.118
5/32"	.1563	.1243
#8	.165	.135
#7	.180	.150
3/16"	.1875	.1555
#6	.203	.173
7/32"	.2188	.1868
1/4"	.250	.210

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
20
22
24
26
28
30
32

CONSTRUCTION:
RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:
BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

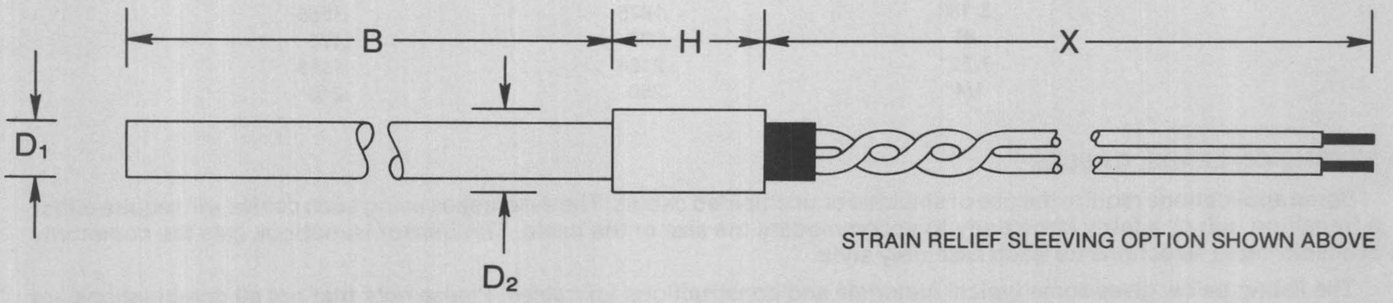
INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

SERIES T2500

STYLE: A series T2500 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to insulated hook up wires and encapsulated into a open end tubing. The tubing has a machined transition hub which permits the use of heavier gauge extension leads. The standard assemblies are made of stainless steel, however, brass or other metals may be specified. The thermistor may be completely encapsulated for maximum protection or may be partially exposed at the tip for fast response.

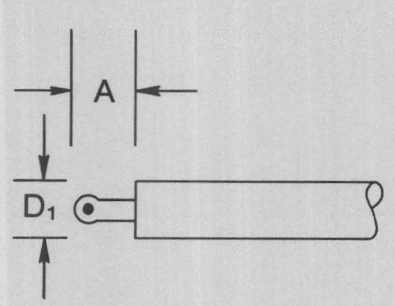
APPLICATION: The series T2500 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies and the ease of handling of the hook up wire terminations. This is accomplished by making a strain relieved splice connection to the larger hook up wires within the machined transition hub. The assemblies may be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for such applications.

FIGURE 1

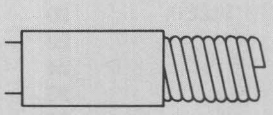


STRAIN RELIEF SLEEVING OPTION SHOWN ABOVE

FIGURE 2



STRAIN RELIEF SPRING OPTION AVAILABLE



(SPRING AVAILABLE ONLY FOR HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

THERMOMETRICS INC.

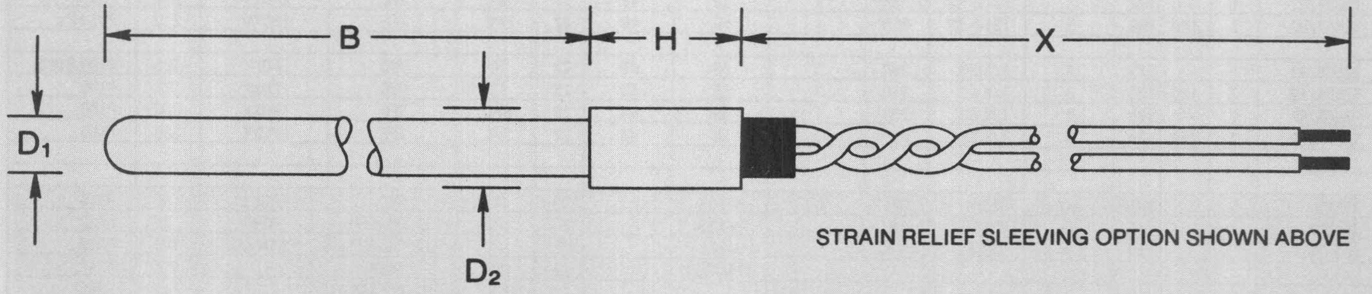
		TIP	TUBING			HUB (MACHINED)			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "A"	DIA "D_1"	LENGTH "B"	MAT'L	DIA. "D_2"	LENGTH "H"	MT'L	LENGTH "X"	GA	ALLOY	INSUL.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T2501/A1	1	—	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	BR16
T2501/A2	2	.030	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P20
T2501/B1	1	—	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	BR16
T2501/B2	2	.030	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P20
T2502/A1	1	—	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	BR23
T2502/A2	2	.035	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P25
T2502/B1	1	—	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	BR23
T2502/B2	2	.035	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P25
T2503/A1	1	—	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	BR32
T2503/A2	2	.040	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P30
T2503/B1	1	—	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	BR32
T2503/B2	2	.040	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P30
T2504/A1	1	—	.072	2-1/2	15 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	BR42 MC50
T2504/A2	2	.100	.072	2-1/2	15 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60
T2504/B1	1	—	.072	2-1/2	15 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	BR42
T2504/B2	2	.100	.072	2-1/2	15 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60
T2505/A1	1	—	.083	2-1/2	14 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	BR55
T2505/A2	2	.100	.083	2-1/2	14 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P65
T2505/B1	1	—	.083	2-1/2	14 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	BR55
T2505/B2	2	.100	.083	2-1/2	14 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P65
T2506/A1	1	—	.095	2-1/2	13 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 BR55
T2506/A2	2	.100	.095	2-1/2	13 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 P65
T2506/B1	1	—	.095	2-1/2	13 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 BR55
T2506/B2	2	.100	.095	2-1/2	13 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 P65
T2507/A1	1	—	.109	3	12TW SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P85
T2507/A2	2	.100	.109	3	12TW SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P85 FP's
T2507/B1	1	—	.109	3	12TW SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P85
T2507/B2	2	.100	.109	3	12TW SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P85 FP's
T2508/A1	1	—	.125	3	1/8 SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2508/A2	2	.100	.125	3	1/8 SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P100
T2508/B1	1	—	.125	3	1/8 SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P100
T2508/B2	2	.100	.125	3	1/8 SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P100
T2500	1	a/r	.0355	a/r	SS304	.187	a/r	SS304	a/r	32	BC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS	to		BRASS		30	TC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250		ALUM.	.500		ALUM.		28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
								PLASTICS		26	NPC	KYNAR		125	BR42
										24	OFHC	FIBERGLASS		175	BR55
										22	Ni	KAPTON		200	
										20		POLYETHYLENE		260	MC50
										18		SIL. RUBBER		300	DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															FP's
															CTP's
															HTP's

SERIES T2600

STYLE: A series T2600 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to insulated hook up wires and encapsulated into a closed end tubing. The tubing has a machined transition hub which permits the use of heavier gauge extension leads. The standard assemblies are made of stainless steel, however, brass or other materials may be specified. The housing is closed in one of three basic shapes with other closures available on special order.

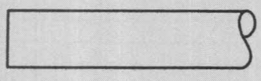
APPLICATION: The series T2600 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies and the ease of handling of the hook up wire terminations. This is accomplished by making a strain relieved splice connection in the transition hub. The closed end tubing provides maximum protection for the thermistor in harsh environments. The assemblies are well suited for immersion in corrosive or conductive fluids up to the transition hub and with some modifications they may be fully immersed over the hub. Please consult the factory for specific information regarding materials selection when conductive or corrosive fluids are involved.

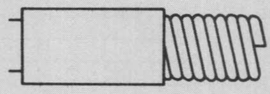
FIGURE 1 (SPHERICAL POINT)



STRAIN RELIEF SLEEVING OPTION SHOWN ABOVE

FIGURE 2 (FLAT, PLUG WELDED POINT)

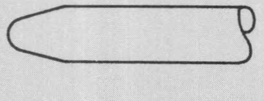




STRAIN RELIEF SPRING OPTION AVAILABLE

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

FIGURE 3 (TAPERED POINT)



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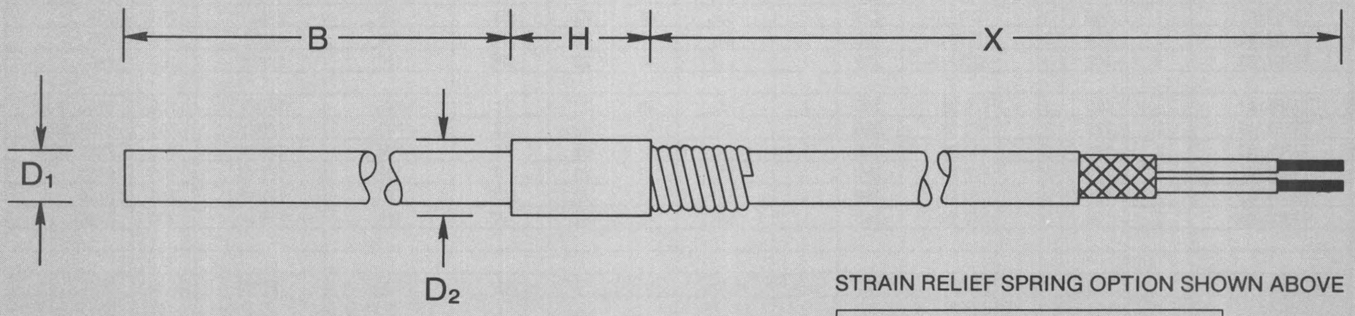
ASSEMBLY PREFIX	FIG.	TUBING			HUB (MACHINED)			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA D_1	LENGTH B	MT'L	DIA D_2	LENGTH H	MT'L	LENGTH "X"	GA	ALLOY	INSUL.			
T2601/A1	1	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P20 BR16
T2601/B1	1	.0355	2-1/4	20TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P20 BR16
T2602/A1	1	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P25 BR23
T2602/B1	1	.0425	2-1/4	19TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P25 BR23
T2603/A1	1	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P30 BR32
T2603/A2	2	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	TC	PVC	EPOXY	105	P30 BR32
T2603/B1	1	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P30 BR32
T2603/B2	2	.050	2-1/4	18TW SS	.250	5/8	SS	48	22	SPC	TFE	EPOXY	200	P30 BR32
T2604/A1	1	.072	2-1/2	#15 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	BR42 MC50
T2604/A2	2	.072	2-1/2	#15 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	BR42 MC50
T2604/B1	1	.072	2-1/2	#15 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	BR42
T2604/B2	2	.072	2-1/2	#15 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	BR42
T2605/A1	1	.083	2-1/2	#14 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 BR55
T2605/A2	2	.083	2-1/2	#14 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 BR55
T2605/B1	1	.083	2-1/2	#14 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 BR55
T2605/B2	2	.083	2-1/2	#14 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 BR55
T2606/A1	1	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 P65
T2606/A2	2	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 P65
T2606/A3	3	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	TC	PVC	EPOXY	105	P60 P65
T2606/B1	1	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 P65
T2606/B2	2	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 P65
T2606/B3	3	.095	2-1/2	#13 SS	.250	3/4	SS	48	22	SPC	TFE	EPOXY	200	P60 P65
T2607/A1	1	.109	3	12TW SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P85
T2607/A2	2	.109	3	12TW SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P85
T2607/A3	3	.109	3	12TW SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P85
T2607/B1	1	.109	3	12TW SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P85
T2607/B2	2	.109	3	12TW SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P85
T2607/B3	3	.109	3	12TW SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P85
T2608/A1	1	.125	3	1/8 SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2608/A2	2	.125	3	1/8 SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2608/A3	3	.125	3	1/8 SS	.250	1	SS	48	22	TC	PVC	EPOXY	105	P100 DC95
T2608/B1	1	.125	3	1/8 SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P100
T2608/B2	2	.125	3	1/8 SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P100
T2608/B3	3	.125	3	1/8 SS	.250	1	SS	48	22	SPC	TFE	EPOXY	200	P100
T2600	1	.0355	a/r	SS304	.187	a/r	SS304	a/r	32	BC	PVC	EPOXY	60	BR16
SERIES	2	to		BRASS	to		BRASS		30	TC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250		ALUMINUM	.500		ALUMINUM		28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
							PLASTICS		26	NPC	KYNAR		125	BR42
									24	OFHC	FIBERGLASS		175	BR55
									22	Ni	SIL. RUBBER		200	
									20		KAPTON		260	MC50
													300	DC95
														P20
														P25
														P30
														P60
														P65
														P85
														P100
														SP's
														CTP's
														HTP's

SERIES T2700

STYLE: A series T2700 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to a coaxial or multiconductor shielded and insulated cable, and encapsulated into a open end metal tubing. The tubing is generally stainless steel, although brass or other metals may be specified, and the transition hub is machined. The thermistor may be completely encapsulated for maximum protection or may be partially exposed at the tip for fast response.

APPLICATION: The series T2700 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies with the ease of handling and interference protection of the shielded cable terminations. This is accomplished by making a strain relieved splice connection to the shielded cable within the transition hub. These assemblies may be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

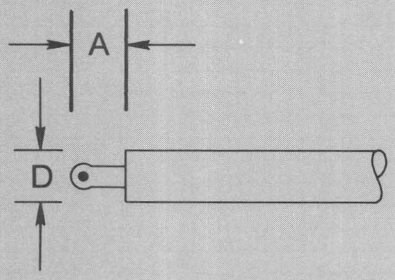
FIGURE 1

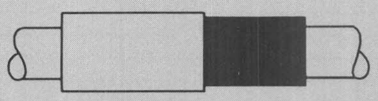


STRAIN RELIEF SPRING OPTION SHOWN ABOVE

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

FIGURE 2





STRAIN RELIEF SLEEVING OPTION AVAILABLE

THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP. DIM. "A"	TUBING			HUB (MACHINED)			SHIELDED/JACKETED CABLE					ENCAPSULANT	MAX TEMP	RECOMMENDED THERMISTOR
			DIA. "D_1"	LENGTH "B"	MT'L	DIA "D_2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL/JKT			
T2701/A1	1	—	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P20 BR16
T2701/A2	2	.030	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P20
T2701/B1	1	—	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2701/B2	2	.030	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P20
T2701/C1	1	—	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P20 BR16
T2701/C2	2	.030	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P20
T2701/D1	1	—	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2701/D2	2	.030	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P20
T2702/A1	1	—	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P25 BR23
T2702/A2	2	.035	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P25
T2702/B1	1	—	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2702/B2	2	.035	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P25
T2702/C1	1	—	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P25 BR23
T2702/C2	2	.035	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P25
T2702/D1	1	—	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2702/D2	2	.035	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P25
T2703/A1	1	—	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P30 BR32
T2703/A2	2	.040	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P30
T2703/B1	1	—	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2703/B2	2	.040	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P30
T2703/C1	1	—	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P30 BR32
T2703/C2	2	.040	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P30
T2703/D1	1	—	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2703/D2	2	.040	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P30
T2704/A1	1	—	.072	2 1/2	15 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2704/A2	2	.100	.072	2 1/2	15 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60
T2704/B1	1	—	.072	2 1/2	15 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	BR 42
T2704/B2	2	.100	.072	2 1/2	15 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60
T2704/C1	1	—	.072	2 1/2	15 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2704/C2	2	.100	.072	2 1/2	15 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60
T2704/D1	1	—	.072	2 1/2	15 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	BR42
T2704/D2	2	.100	.072	2 1/2	15 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60
T2705/A1	1	—	.083	2 1/2	14 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2705/A2	2	.100	.083	2 1/2	14 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2705/B1	1	—	.083	2 1/2	14 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2705/B2	2	.100	.083	2 1/2	14 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2705/C1	1	—	.083	2 1/2	14 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 BR55
T2705/C2	2	.100	.083	2 1/2	14 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2705/D1	1	—	.083	2 1/2	14 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2705/D2	2	.100	.083	2 1/2	14 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2706/A1	1	—	.095	2 1/2	13 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2706/A2	2	.100	.095	2 1/2	13 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2706/B1	1	—	.095	2 1/2	13 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2706/B2	2	.100	.095	2 1/2	13 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2706/C1	1	—	.095	2 1/2	13 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2706/C2	2	.100	.095	2 1/2	13 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2706/D1	1	—	.095	2 1/2	13 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2706/D2	2	.100	.095	2 1/2	13 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2707/A1	1	—	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2707/A2	2	.100	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T2707/B1	1	—	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2707/B2	2	.100	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T2707/C1	1	—	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2707/C2	2	.100	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85 FP's
T2707/D1	1	—	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2707/D2	2	.100	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85 FP's
T2708/A1	1	—	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2708/A2	2	.100	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T2708/B1	1	—	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2708/B2	2	.100	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2708/C1	1	—	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2708/C2	2	.100	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100
T2708/D1	1	—	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2708/D2	2	.100	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100

			TUBING			HUB (MACHINED)			SHIELDED/JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	TIP. DIM. "A"	DIA. "D_1"	LENGTH "B"	MT'L	DIA "D_2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL/JKT	ENCAPSULANT	MAX TEMP	RECOMMENDED THERMISTOR
T2700	1	a/r	.0355	a/r	SS304	.187	a/r	SS304	a/r	1+S	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS	to		BRASS		2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250		ALUMINUM	.500		ALUMINUM		3	28	SPC	TEFLON (TFE)		105	BR32
								PLASTICS		4	26	NPC	POLYETHYLENE		175	BR42
											24	SCCW	SIL.RUBBER		200	BR55
										RG	22	BCW	NEOPRENE		260	
											20					MC50
																DC95
																P20
																P25
																P30
																P60
																P65
																P85
																100
																SP's
																FP's
																CTP's

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

TUBING: OTHER METALS

Support tubings for assemblies can be specified from other alloys or metals upon special order and subject to availability. Some common tubing materials which are available for special orders are as follows:

COPPER
HASTALLOY C
INCONEL 600
MONEL 400
NICKEL 200
TITANIUM

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:

20
22
24
26
28
30
32

CONSTRUCTION:

RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:

BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

INSULATIONS:

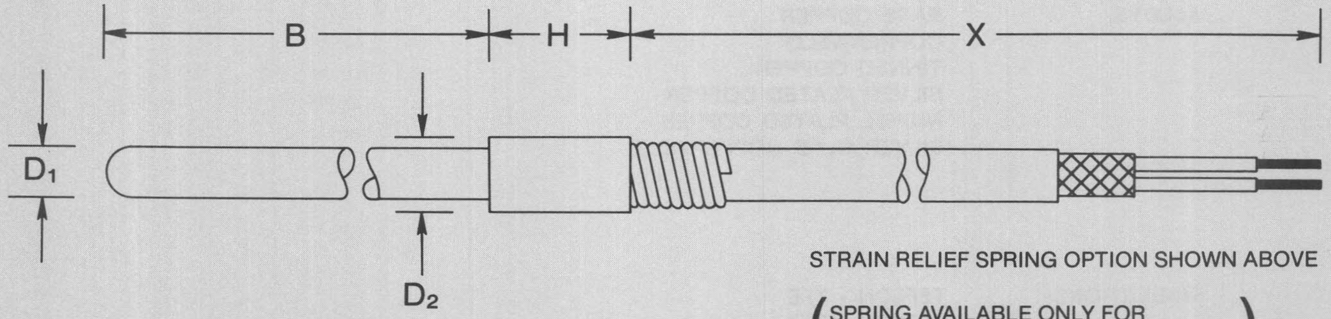
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

SERIES T2800

STYLE: A series T2800 assembly consists of a ruggedized glass bead, a glass probe or an epoxy coated chip thermistor attached to a coaxial or multiconductor shielded and insulated cable, and encapsulated into a closed end metal tubing. The tubing is generally stainless steel, although brass or other metals may be specified, and the transition hub is machined. The tubing is closed in one of three basic shapes with other closures available on special order.

APPLICATION: The series T2800 assemblies are extremely rugged sensor packages which combine the fast response features of the small diameter tube assemblies with the ease of handling and interference protection of the shielded cable terminations. This is accomplished by making a strain relieved splice connection to the shielded cable within the transition hub. The closed end tubing provides maximum protection for the thermistor in harsh environments. The assemblies are well suited for immersion in corrosive and conductive fluids up to the transition hub and with some modifications they may be fully immersed over the hub. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1 (SPHERICAL POINT)



STRAIN RELIEF SPRING OPTION SHOWN ABOVE

(SPRING AVAILABLE ONLY FOR HUB DIAMETERS GREATER THAN .250")

When the strain relief spring option is selected, add the letter "S" after the assembly prefix number.

FIGURE 2 (FLAT, PLUG WELDED POINT)

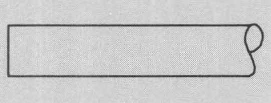
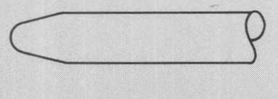
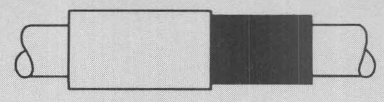


FIGURE 3 (TAPERED POINT)





STRAIN RELIEF SLEEVING OPTION AVAILABLE

THERMOMETRICS INC.

ASSEMBLY	FIG.	TUBING			HUB (MACHINED)			SHIELDED/JACKETED CABLE					ENCAPSULANT	MAX	RECOMMENDED
PREFIX		DIA. "D_1"	LENGTH "B"	MT'L	DIA "D_2"	LENGTH "H"	MT'L	LENGTH "X"	# COND	GA	ALLOY	INSUL/JKT		TEMP	THERMISTOR
T2801/A1	1	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P20 BR16
T2801/B1	1	.0355	2 1/4	20TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2801/C1	1	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P20 BR16
T2801/D1	1	.0355	2 1/4	20TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P20 BR16
T2802/A1	1	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P25 BR23
T2802/B1	1	.0425	2 1/4	19TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2802/C1	1	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P25 BR23
T2802/D1	1	.0425	2 1/4	19TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P25 BR23
T2803/A1	1	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P30 BR32
T2803/A2	2	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P30 BR32
T2803/B1	1	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2803/B2	2	.050	2 1/4	18TW SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2803/C1	1	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P30 BR32
T2803/C2	2	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P30 BR32
T2803/D1	1	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2803/D2	2	.050	2 1/4	18TW SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P30 BR32
T2804/A1	1	.072	2 1/2	15 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2804/A2	2	.072	2 1/2	15 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2804/B1	1	.072	2 1/2	15 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	BR42
T2804/B2	2	.072	2 1/2	15 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	BR42
T2804/C1	1	.072	2 1/2	15 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2804/C2	2	.072	2 1/2	15 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	BR42 MC50
T2804/D1	1	.072	2 1/2	15 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	BR42
T2804/D2	2	.072	2 1/2	15 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	BR42
T2805/A1	1	.083	2 1/2	14 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2805/A2	2	.083	2 1/2	14 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 BR55
T2805/B1	1	.083	2 1/2	14 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2805/B2	2	.083	2 1/2	14 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2805/C1	1	.083	2 1/2	14 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 BR55
T2805/C2	2	.083	2 1/2	14 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 BR55
T2805/D1	1	.083	2 1/2	14 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2805/D2	2	.083	2 1/2	14 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 BR55
T2806/A1	1	.095	2 1/2	13 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/A2	2	.095	2 1/2	13 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/A3	3	.095	2 1/2	13 SS	.250	1	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/B1	1	.095	2 1/2	13 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2806/B2	2	.095	2 1/2	13 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2806/B3	3	.095	2 1/2	13 SS	.250	1	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T2806/C1	1	.095	2 1/2	13 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/C2	2	.095	2 1/2	13 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/C3	3	.095	2 1/2	13 SS	.250	1	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P60 P65
T2806/D1	1	.095	2 1/2	13 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2806/D2	2	.095	2 1/2	13 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2806/D3	3	.095	2 1/2	13 SS	.250	1	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P60 P65
T2807/A1	1	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2807/A2	2	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2807/A3	3	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T2807/B1	1	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2807/B2	2	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2807/B3	3	.109	3	12TW SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T2807/C1	1	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2807/C2	2	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2807/C3	3	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P85
T2807/D1	1	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2807/D2	2	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2807/D3	3	.109	3	12TW SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P85
T2808/A1	1	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/A2	2	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/A3	3	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/B1	1	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2808/B2	2	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2808/B3	3	.125	3	1/8 SS	.250	1 1/4	SS	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T2808/C1	1	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/C2	2	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/C3	3	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	TC	PVC/PVC	EPOXY	105	P100 DC95
T2808/D1	1	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2808/D2	2	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100
T2808/D3	3	.125	3	1/8 SS	.250	1 1/4	SS	48	4	26	SPC	TFE/TFE	EPOXY	200	P100

ASSEMBLY PREFIX	FIG.	TUBING DIA. "D_1"	 LENGTH "B"	 MT'L	HUB (MACHINED) DIA "D_2"	 LENGTH "H"	 MT'L	SHIELDED/JACKETED CABLE LENGTH "X"	 # COND	 GA	 ALLOY	 INSUL/JKT	ENCAPSULANT	MAX TEMP	RECOMMENDED THERMISTOR
T2800	1	.0355	a/r	SS304	.187	a/r	SS 304	a/r	1+S	32	TC	PVC	EPOXY	60	BR16
SERIES	2	.to		BRASS	to		BRASS		2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250		ALUMINUM	.500		ALUMINUM		3	28	SPC	TEFLON(FEP)		105	BR32
							PLASTICS		4	26	NPC	POLYETHYLENE		175	BR42
										24	SCCW	SIL. RUBBER		200	BR55
									RG	22	BCW	NEOPRENE		260	
										20					MC50
															DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															FP's
															CTP's

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	20 22 24 26 28 30 32
CONSTRUCTION:	RG CABLE 1 CONDUCTOR + SHIELD 2 CONDUCTORS W/ - OR - W/O SHIELD 3 CONDUCTORS W/ - OR - W/O SHIELD 4 CONDUCTORS W/ - OR - W/O SHIELD
ALLOYS:	BARE COPPER COPPERWELD TINNED COPPER SILVER PLATED COPPER NICKEL PLATED COPPER SILVER CLAD COPPERWELD
INSULATIONS:	TEFLON - TFE TEFLON - FEP POLYVINYL CHLORIDE - PVC POLYETHYLENE POLYPROPYLENE NEOPRENE SILICONE RUBBER FIBERGLASS

SERIES T3000

STYLE: A series T3000 assembly consists of a glass coated thermistor or a miniature glass probe thermistor with insulated extension leads and encapsulated into a hypodermic needle. The hypodermic needle consists of a point ground cannula and a plastic hub. The point may be any of the standard bevels shown in the list of options or may be of special design, such as a deflected point, upon special order.

A series T3100 assembly uses a chrome plated brass hub on the hypodermic needle assembly.

APPLICATION: The series T3000 assemblies may be used in many biomedical applications where a sharpened point is desired on the assembly for insertion into plant fibers, animal tissues, slurries or semi-solids and so forth. The assemblies are suitable for immersion up to the hub in most applications, however, they are not intended for use in humans or in conductive or corrosive fluids without additional assembly modifications. Please consult the factory for specific information regarding materials selection in such applications.

FIGURE 1 T3000

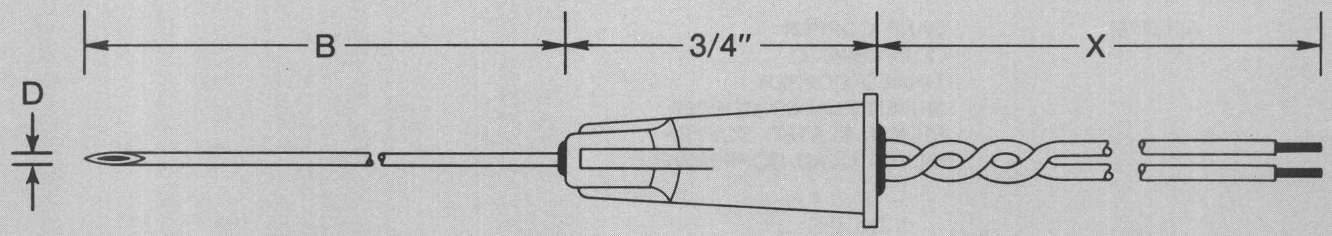
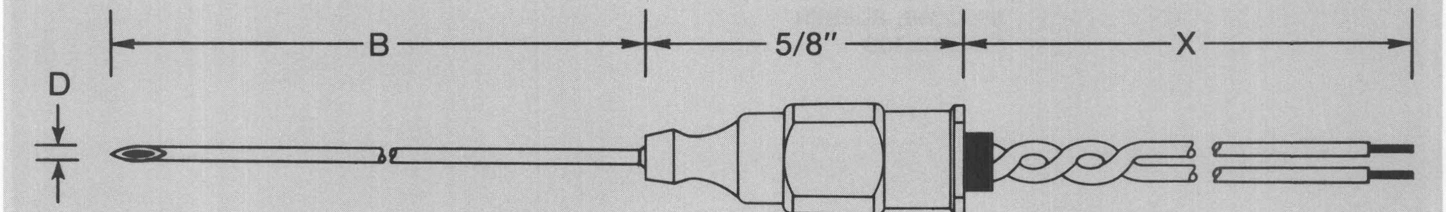


FIGURE 2 T3100



THERMOMETRICS INC.

		HYPO NEEDLE W/HUB				EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	GAUGE	POINT	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T3001/A1	1	.025	1	23	REGULAR	48	32	TC	PVC	EPOXY	105	B05 B07
T3001/B1	1	.025	1	23	REGULAR	48	32	SPC	TFE	EPOXY	105	B05 B07
T3002/A1	1	.028	1	22	REGULAR	48	32	TC	PVC	EPOXY	105	B10 BR11
T3002/B1	1	.028	1	22	REGULAR	48	32	SPC	TFE	EPOXY	105	B10 BR11
T3003/A1	1	.032	1	21	REGULAR	48	30	TC	PVC	EPOXY	105	B14 BR14
T3003/B1	1	.032	1	21	REGULAR	48	30	SPC	TFE	EPOXY	105	B14 BR14
T3004/A1	1	.0355	1	20	REGULAR	48	30	TC	PVC	EPOXY	105	BR16 P20
T3004/B1	1	.0355	1	20	REGULAR	48	30	SPC	TFE	EPOXY	105	BR16 P20
T3005/A1	1	.0425	1-1/2	19 TW	REGULAR	48	28	TC	PVC	EPOXY	105	BR23 P25
T3005/B1	1	.0425	1-1/2	19 TW	REGULAR	48	28	SPC	TFE	EPOXY	105	BR23 P25
T3006/A1	1	.050	1-1/2	18	REGULAR	48	28	TC	PVC	EPOXY	105	BR32 P30
T3006/B1	1	.050	1-1/2	18	REGULAR	48	28	SPC	TFE	EPOXY	105	BR32 P30
T3101/A1	2	.025	1	23 TW	18° BEVEL	48	32	TC	PVC	EPOXY	105	B05 B07
T3101/B1	2	.025	1	23 TW	18° BEVEL	48	32	SPC	TFE	EPOXY	200	B05 B07
T3102/A1	2	.028	1	22 TW	18° BEVEL	48	32	TC	PVC	EPOXY	105	B10 BR11
T3102/B1	2	.028	1	22 TW	18° BEVEL	48	32	SPC	TFE	EPOXY	200	B10 BR11
T3103/A1	2	.032	1	21 TW	18° BEVEL	48	30	TC	PVC	EPOXY	105	B14 BR14
T3103/B1	2	.032	1	21 TW	18° BEVEL	48	30	SPC	TFE	EPOXY	200	B14 BR14
T3104/A1	2	.0355	1	20 TW	18° BEVEL	48	30	TC	PVC	EPOXY	105	BR16 P20
T3104/B1	2	.0355	1	20 TW	18° BEVEL	48	30	SPC	TFE	EPOXY	200	BR16 P20
T3105/A1	2	.0425	1-1/2	19 TW	18° BEVEL	48	28	TC	PVC	EPOXY	105	BR23 P25
T3105/B1	2	.0425	1-1/2	19 TW	18° BEVEL	48	28	SPC	TFE	EPOXY	200	BR23 P25
T3106/A1	2	.050	1-1/2	18 TW	18° BEVEL	48	28	TC	PVC	EPOXY	105	BR32 P30
T3106/B1	2	.050	1-1/2	18 TW	18° BEVEL	48	28	SPC	TFE	EPOXY	200	BR32 P30
T3000	1	.022	a/r	24 xx GA.	13° REGULAR	a/r	32	TC	PVC	EPOXY	60	B05
T3100	2	TO		TO	18° BEVEL		30	SPC	TEFLON (TFE)	RTV	80	B07
		.072		15 GA.	30°		28	NPC	TEFLON (FEP)		105	B10
SERIES					45°			OFHC	KYNAR		125	B14
OPTIONS					90°			Ni	KAPTON		175	B35
								BC	POLYETHYLENE		200	B43
					SPECIAL*							
												BR11
												BR14
												BR16
												BR23
												BR32
												BR42
												BR55
												P20
												P25
												P30

SPECIAL ASSEMBLY DESIGN:

The assemblies and mounts shown in the Sensor Handbook represent basic constructions which are suitable for a wide variety of applications. For a more specific application, however, a custom assembly can be designed by using the listing of standard materials and specifying the appropriate dimensions and/or features. Thermometrics' Applications Engineers are ready and willing to assist the designer in materials selection and packaging.

Please note that such custom assemblies are not truly unique or different if they can be constructed from the basic materials listed in this Sensor Handbook. Most of the materials and enclosures shown in the Sensor Handbook are stocked so that assembly lead-times can be held to a minimum. When special materials or special fabrications are required, the designer should allow for additional assembly lead-time and anticipate higher costs.

In certain cases, the customer may provide special materials or components to Thermometrics Inc. for inclusion in a custom assembly. Such customer supplied materials may provide a savings in time, expense or both for special orders. Please contact our Applications Engineering department for additional information and assistance regarding materials selection and/or customer supplied materials or hardware.

SERIES T5000

STYLE: A series T5000 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into a closed end tubing. The tubing has a straight thread hub with a hex body and is generally made of stainless steel, although brass and other metals are available. The straight thread may extend the full length of the hub or only part way as required. The tubing is welded or brazed to the hub and is closed in one of three basic tip shapes.

APPLICATION: The series T5000 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum protection for the thermistor in harsh environments. They are particularly well suited for immersion applications in conductive or corrosive fluids. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1 (SPHERICAL POINT)

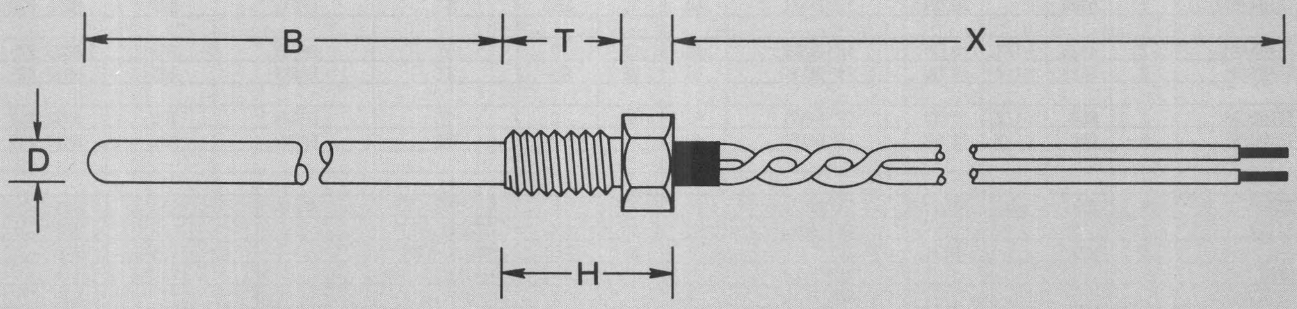


FIGURE 2 (FLAT, PLUG WELDED POINT)

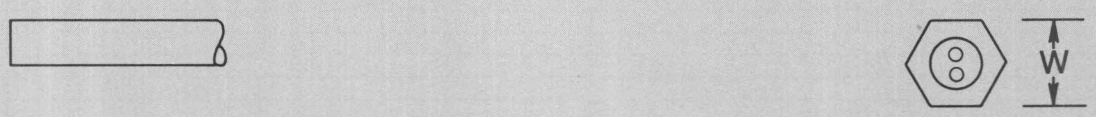
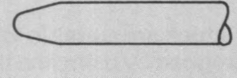


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

		TUBING			THREADED HUB				EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MAT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	"W"	LENGTH "X"	GA	ALLOY	INSUL.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T5001/A1	1	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	200	BR42 MC40
T5001/B1	1	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR16 P20
T5002/A1	1	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR23 P25
T5002/B1	1	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR23 P25
T5003/A1	1	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR32 P30
T5003/A2	2	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR32 P30
T5003/B1	1	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR32 P30
T5003/B2	2	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR32 P30
T5004/A1	1	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5004/A2	2	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5004/B1	1	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR42
T5004/B2	2	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR42
T5005/A1	1	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR55 P60
T5005/A2	2	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR55 P60
T5005/B1	1	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR55 P60
T5005/B2	2	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR55 P60
T5006/A1	1	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P65
T5006/A2	2	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P65
T5006/A3	3	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P65
T5006/B1	1	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P65
T5006/B2	2	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P65
T5006/B3	3	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P65
T5007/A1	1	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85
T5007/A2	2	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85
T5007/A3	3	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85
T5007/B1	1	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85
T5007/B2	2	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85
T5007/B3	3	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85
T5008/A1	1	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100 DC95
T5008/A2	2	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100 DC95
T5008/A3	3	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100 DC95
T5008/B1	1	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5008/B2	2	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5008/B3	3	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5000	1	.036	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR16
SERIES	2	to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
						1/4-20				26	NPC	KYNAR		125	BR42
						5/16-18				24	OFHC	FIBERGLASS		175	BR55
										22	Ni	SIL. RUBBER		200	
						10-32				20		KAPTON		260	MC50
						12-28				18		POLYETHYLENE		300	DC95
						1/4-28									
						5/16-24									P20
															P25
															P30
															P60
															P65
															P85
															P100
															CTP's
															HTP's
															SP's

SERIES T5100

STYLE: A series T5100 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into an open end tubing. The tubing has a straight thread hub with a hex body and is generally made of stainless steel, although brass and other metals are available. The straight thread may extend the full length of the hub or only part way as required. The tubing is welded or brazed to the hub and the thermistor may be fully encapsulated for maximum protection or may be partially exposed at the tip for fast response.

APPLICATION: The series T5100 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for such applications. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1

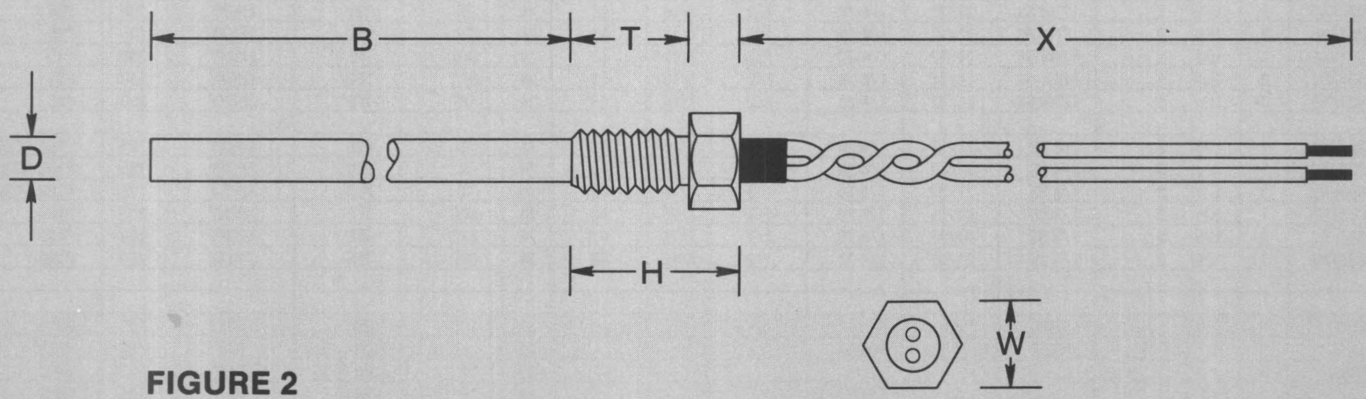
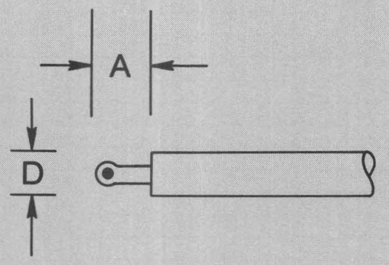


FIGURE 2



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP DIA. "A"	TUBING			THREADED HUB				EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MAT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	"W"	LENGTH "X"	GA	ALLOY	INSUL.			
T5101/A1	1	—	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P20 BR16
T5101/A2	2	.030	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P20
T5101/B1	1	—	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P20 BR16
T5101/B2	2	.030	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P20
T5102/A1	1	—	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P25 BR23
T5102/A2	2	.035	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P25
T5102/B1	1	—	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P25 BR23
T5102/B2	2	.035	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P25
T5103/A1	1	—	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P30 BR32
T5103/A2	2	.040	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P30
T5103/B1	1	—	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P30 BR32
T5103/B2	2	.040	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P30
T5104/A1	1	—	.072	2-1/4	15 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5104/A2	2	.100	.072	2-1/4	15 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60
T5104/B1	1	—	.072	2-1/4	15 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR42
T5104/B2	2	.100	.072	2-1/4	15 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60
T5105/A1	1	—	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	BR55
T5105/A2	2	.100	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60
T5105/B1	1	—	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	BR55
T5105/B2	2	.100	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60
T5106/A1	1	—	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60
T5106/A2	2	.100	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60
T5106/B1	1	—	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60
T5106/B2	2	.100	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60
T5107/A1	1	—	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85 FP's
T5107/A2	2	.100	109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85 FP's
T5107/B1	1	—	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5107/B2	2	.100	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5108/A1	1	—	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100 DC95
T5108/A2	2	.100	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100
T5108/B1	1	—	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5108/B2	2	.100	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5100	1	a/r	.036	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
							1/4-20				26	NPC	KYNAR		125	BR42
							5/16-18				24	OFHC	FIBERGLASS		175	BR55
											22	Ni	SIL. RUBBER		200	
							10-32				20		KAPTON		260	MC50
							12-28				18		POLYETHYLENE		300	DC95
							1/4-28									
							5/16-24									P20
																P25
																P30
																P60
																P65
																P85
																P100
																FP's
																CTP's
																SP's

SERIES T5200

STYLE: A series T5200 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into an open end tubing. The tubing is welded or brazed to a straight thread hub having a hex body and the tip is slotted or drilled. The material is generally stainless steel, although brass and other metals are available. The threads may extend the full length of the hub or only part way as required. The thermistor is recessed into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T5200 assemblies are extremely rugged sensor packages which combine the protection features of a fully enclosed assembly and the fast response features of an open tip assembly. They are suitable for gas or fluid flow measurements where fast response is important. Bead or chip thermistors may be used for gas or non-conductive liquid applications, however, probe thermistors are more suitable for most liquid applications. Please consult the factory for specific information regarding materials selection when conductive or corrosive fluids will be encountered. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1

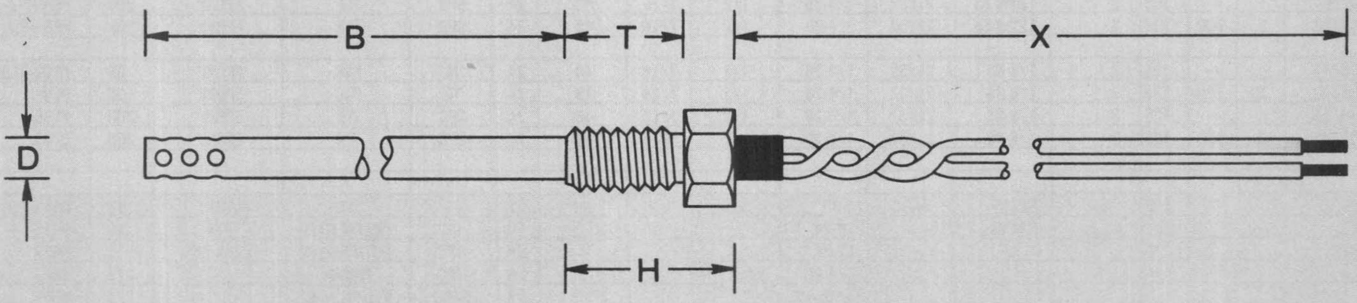
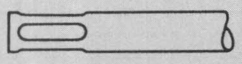


FIGURE 2



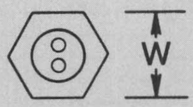
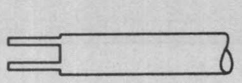


FIGURE 3



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			THREADED HUB				EXTENSION LEADS				ENCAPSULANT	MAX. TEMP	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	HEX "W"	LENGTH "X"	GA	ALLOY	INSULATION			
T5201/A1	1	(12) x .031	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60 P65
T5201/B1	1	(12) x .031	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60 P65
T5201/C1	2	(4) .031 x .125	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60 P65
T5201/D1	2	(4) .031 x .125	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60 P65
T5201/E1	3	(4) .031 x .095	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P60 P65
T5201/F1	3	(4) .031 x .095	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P60 P65
T5202/A1	1	(12) x .036	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85 FP's
T5202/B1	1	(12) x .036	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5202/C1	2	(4) .036 x .140	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85 FP's
T5202/D1	2	(4) .036 x .140	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5202/E1	3	(4) .036 x .110	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P85 FP's
T5202/F1	3	(4) .036 x .110	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5203/A1	1	(12) x .047	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100
T5203/B1	1	(12) x .047	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5203/C1	2	(4) .047 x .187	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100
T5203/D1	2	(4) .047 x .187	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5203/E1	3	(4) .047 x .141	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	TC	PVC	EPOXY	105	P100
T5203/F1	3	(4) .047 x .141	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	24	SPC	TFE	EPOXY	200	P100
T5200	1	a/r	.095	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3		.187				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
							1/4-20				26	NPC	KYNAR		125	BR42
							5/16-18				24	OFHC	FIBERGLASS		175	BR55
											22	Ni	SIL. RUBBER		200	
							10-32				20		KAPTON		260	MC50
							12-28				18		POLYETHYLENE		300	DC95
							1/4-28									
							5/16-24									P20
																P25
																P30
																P60
																P65
																P85
																P100
																FP's
																CTP's
																HTP's
																SP's

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
- 18
- 20
- 22
- 24
- 26
- 28
- 30
- 32

CONSTRUCTION:
- SOLID
- STRANDED

ALLOYS:
- BARE COPPER
- TINNED COPPER
- SILVER PLATED COPPER
- NICKEL PLATED COPPER
- OFHC COPPER
- NICKEL
- DUMET

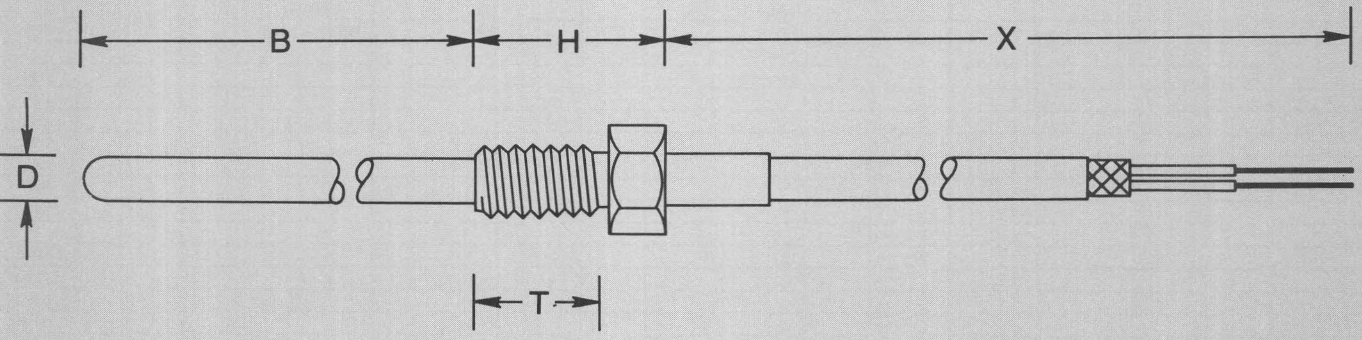
INSULATIONS:
- TEFLON - TFE
- TEFLON - FEP
- POLYVINYL CHLORIDE - PVC
- SILICONE RUBBER
- POLYIMIDE
- FIBERGLASS
- POLYETHYLENE
- POLYALKENE
- FLUOROCARBON/POLYIMIDE
- KYNAR
- TEFZEL

SERIES T5300

STYLE: A series T5300 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into a closed end tubing. The tubing is welded or brazed to a straight thread hub having a hex body. The tubing is generally of stainless steel and is closed in one of three basic shapes. Other materials and enclosures are available on special order. The thread may extend the full length of the hub or only part way as required.

APPLICATION: The series T5300 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications where durability and interference protection are important. The assemblies are particularly well suited for immersion applications in conductive or corrosive fluids and they provide maximum protection for the thermistor in harsh environments. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1 (SPHERICAL POINT)



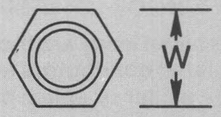


FIGURE 2 (FLAT, PLUG WELDED POINT)

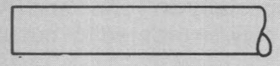
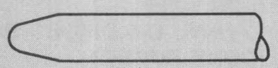


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING			THREADED HUB				SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	HEX "W"	LENGTH "X"	# COND.	GA	ALLOY	INSUL./JKT			
T5301/A1	1	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR16 P20
T5301/B1	1	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR16 P20
T5302/A1	1	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR23 P25
T5302/B1	1	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR23
T5303/A1	1	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR32 P30
T5303/A2	2	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR32 P30
T5303/B1	1	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR32 P30
T5303/B2	2	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR32 P30
T5304/A1	1	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T5304/A2	2	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T5304/B1	1	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR42
T5304/B2	2	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR42
T5305/A1	1	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR55 P60
T5305/A2	2	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR55 P60
T5305/B1	1	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR55 P60
T5305/B2	2	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR55 P60
T5306/A1	1	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P65
T5306/A2	2	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P65
T5306/A3	3	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P65
T5306/B1	1	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P65
T5306/B2	2	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P65
T5306/B3	3	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P65
T5307/A1	1	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85
T5307/A2	2	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85
T5307/A3	3	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85
T5307/B1	1	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85
T5307/B2	2	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85
T5307/B3	3	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85
T5308/A1	1	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100 DC95
T5308/A2	2	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100 DC95
T5308/A3	3	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100 DC95
T5308/B1	1	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5308/B2	2	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5308/B3	3	.125	3	1/8 SS	21/32	1/4-20	12/	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5300	1	.036	a/r	SS304	a/r	8-32	a/r	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR16
SERIES	2	to		BRASS		10-24				2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3	.250				12-24				3	28	SPC	TEFLON (FEP)		105	BR32
						1/4-20				4	26	NPC	POLYETHYLENE		175	BR42
						5/16-18					24	SCCW	SIL. RUBBER		200	BR55
										RG	22	BCW	NEOPRENE		260	
						10-32					20					MC50
						12-28										DC95
						1/4-28										
						5/16-24										P20
																P25
																P30
																P60
																P65
																P85
																P100
																SP's
																FP's
																CTP's

SERIES T5400

STYLE: A series T5400 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing. The tubing is welded or brazed to a straight thread hub having a hex body and is generally made of stainless steel, although brass and other metals are available. The straight thread may extend the full length of the hub or only part way as required. The thermistor may be fully encapsulated for maximum protection or may be partially exposed for fast response.

APPLICATION: The series T5400 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement applications where fast response and interference protection are important. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1

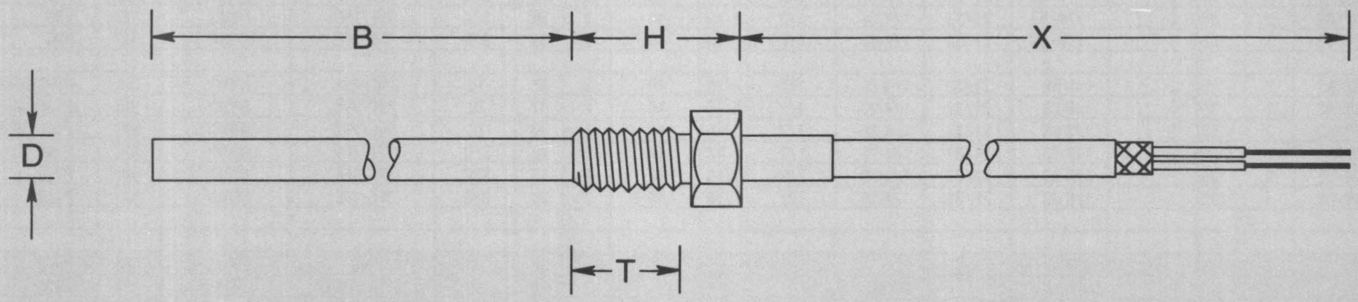
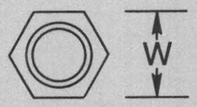
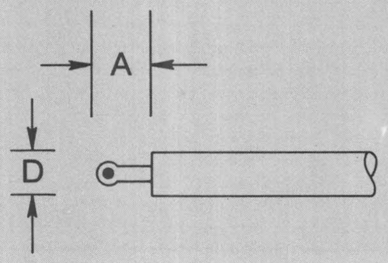


FIGURE 2





THERMOMETRICS INC.

		TIP	TUBING			THREADED HUB				SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIM "A"	DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	HEX "W"	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T5401/A1	1	—	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P20 BR16
T5401/A2	2	.030	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P20
T5401/B1	1	—	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P20 BR16
T5401/B2	2	.030	.0355	2-1/4	20TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P20
T5402/A1	1	—	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P25 BR23
T5402/A2	2	.035	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P25
T5402/B1	1	—	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P25 BR23
T5402/B2	2	.035	.0425	2-1/4	19TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P25
T5403/A1	1	—	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P30 BR32
T5403/A2	2	.040	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P30
T5403/B1	1	—	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P30 BR32
T5403/B2	2	.040	.050	2-1/4	18TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P30
T5404/A1	1	—	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR42 MC50
T5404/A2	2	.100	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60
T5404/B1	1	—	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR42
T5404/B2	2	.100	.072	2-1/2	15 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60
T5405/A1	1	—	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	BR55
T5405/A2	2	.100	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5405/B1	1	—	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	BR55
T5405/B2	2	.100	.083	2-1/2	14 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5406/A1	1	—	.095	2-1/2	12 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5406/A2	2	.100	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5406/B1	1	—	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5406/B2	2	.100	.095	2-1/2	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5407/A1	1	—	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85 FP's
T5407/A2	2	.100	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85 FP's
T5407/B1	1	—	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85
T5407/B2	2	.100	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85
T5408/A1	1	—	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100 DC95
T5408/A2	2	.100	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100
T5408/B1	1	—	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5408/B2	2	.100	.125	3	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5400	1	a/r	.036	a/r	SS304	a/r	8-32	a/r	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS		10-24				2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS			.250				12-24				3	28	SPC	TFELON (FEP)		105	BR32
							1/4-20				4	26	NPC	POLYETHYLENE		175	BR42
							5/16-18					24	SCCW	SIL. RUBBER		200	BR55
											RG	22	BCW	NEOPRENE		260	
							10-32					20					MC50
							12-28										DC95
							1/4-28										
							5/16-24										P20
																	P25
																	P30
																	P60
																	P65
																	P85
																	P100
																	SP's
																	FP's
																	CTP's

SERIES T5500

STYLE: A series T5500 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing. The tubing is welded or brazed to a straight thread hub having a hex body and the tip is slotted or drilled. The material is generally stainless steel, although brass and other metals are available. The threads may extend the full length of the hub or only part way as required. The thermistor is recessed into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T5500 assemblies are extremely rugged sensor packages which combine the mechanical protection features of an enclosed assembly, the fast response features of an open tip assembly and the interference protection of a shielded cable. They are suitable for gas or fluid flow measurements where fast response is important. Bead or chip thermistors may be used for gas or non-conductive liquid applications, however, probe thermistors are more suitable for most liquid applications. Please consult the factory for specific information regarding materials selection when conductive or corrosive fluids will be encountered. The threaded hub provides easy mounting and positioning of the assembly.

FIGURE 1

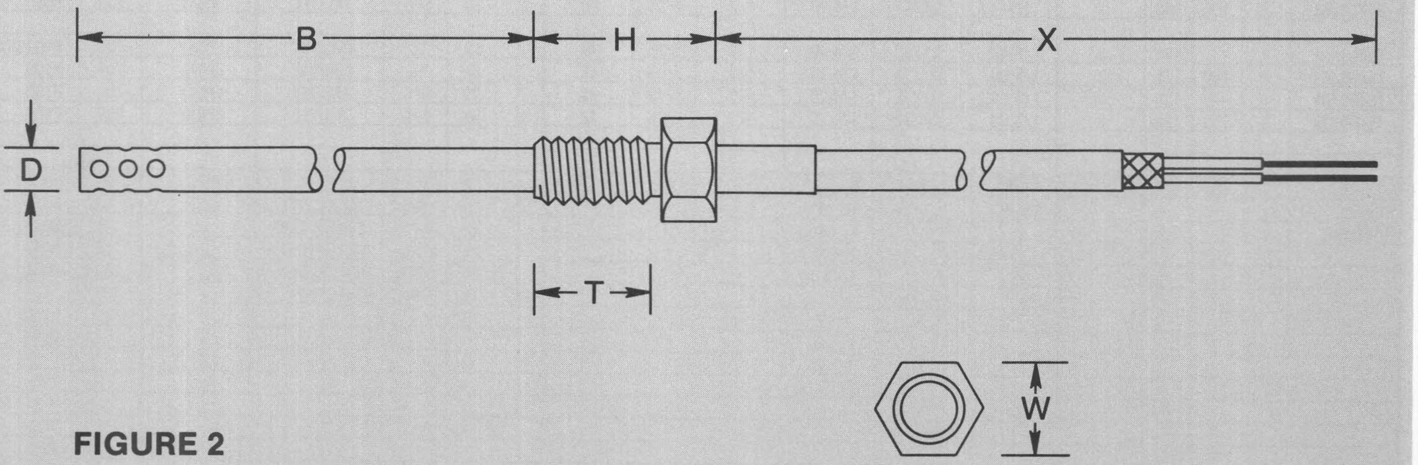


FIGURE 2

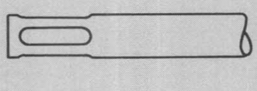
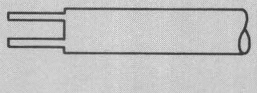


FIGURE 3



ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			THREADED HUB				SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	HEX "W"	LENGTH "X"	# COND.	GA	ALLOY	INSUL/JKT			
T5501/A1	1	(12) x .031	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5501/B1	1	(12) x .031	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5501/C1	2	(4) .031 x .125	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5501/D1	2	(4) .031 x .125	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5501/E1	3	(4) .031 x .095	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P60 P65
T5501/F1	3	(4) .031 x .095	.095	3	13 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P60 P65
T5502/A1	1	(12) x .036	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85 FP's
T5502/B1	1	(12) x .036	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 FP's
T5502/C1	2	(4) .036 x .140	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85 FP's
T5502/D1	2	(4) .036 x .140	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 FP's
T5502/E1	3	(4) .036 x .110	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P85 FP's
T5502/F1	3	(4) .036 x .110	.109	3	12TW SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P85 FP's
T5503/A1	1	(12) x .047	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100
T5503/B1	1	(12) x .047	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5503/C1	2	(4) .047 x .187	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100
T5503/D1	2	(4) .047 x .187	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5503/E1	3	(4) .047 x .141	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	32	TC	PVC/PVC	EPOXY	105	P100
T5503/F1	3	(4) .047 x .141	.125	4	1/8 SS	21/32	1/4-20	1/2	7/16	48	2	30	SPC	TFE/TFE	EPOXY	200	P100
T5500	1	a/r	.095	a/r	SS304	a/r	8-32	a/r	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR16
SERIES	2		to		BRASS		10-24				2	30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	3		.250				12-24				3	28	SPC	TEFLON (FEP)		105	BR32
							1/4-20				4	26	NPC	POLYETHYLENE		175	BR42
							5/16-18					24	SCCW	SIL. RUBBER		200	BR55
											RG	22	BCW	NEOPRENE		260	
							10-32					20					MC50
							12-28										DC95
							1/4-28										
							5/16-24										P20
																	P25
																	P30
																	P60
																	P65
																	P85
																	P100
																	SP's
																	FP's
																	CTP's

THREADS:

Threaded bodies for surface mount assemblies and threaded hubs for immersion assemblies are available in all standard sizes and classifications.

The Sensor Handbook shows the most common threaded bodies and hubs in the options listing for each assembly type. Other threads and thread lengths may be specified for custom assemblies except that thread diameters and pitches will be governed by industry standards. A partial listing of thread types which are available for thermistor assemblies is as follows:

NC/UNC	NF/UNF
4 - 40	4 - 48
5 - 40	5 - 44
6 - 32	6 - 40
8 - 32	8 - 36
10 - 24	10 - 32
12 - 24	12 - 28
1/4 - 20	1/4 - 28
5/16 - 18	5/16 - 24
3/8 - 16	3/8 - 24
7/16 - 14	7/16 - 20
1/2 - 12	1/2 - 20

NEF/UNEF	NPT
12 -32	1/16 -27
1/4 - 32	1/8 - 27
5/16 - 32	1/4 - 18
3/8 - 32	3/8 - 18
7/16 - 28	1/2 - 14
1/2 - 28	

SERIES T5600

STYLE: A series T5600 assembly consists of a thermistor attached to insulated hook up wire and encapsulated into a small to medium sized closed end tubing. The tubing is closed in one of three basic tip shapes and generally made of stainless steel, although other metals or closures are available. The tube is welded or brazed to a fully threaded hub having milled slots for insertion by means of a spanner wrench or tool.

APPLICATION: The series T5600 assemblies may be used in many general temperature measurement or control applications where mounting space is confined and mounting torques will be low. The small to medium sized closed end tubes provide maximum protection for the thermistor in harsh environment as well as fast response times. The assemblies are particularly well suited for immersion in conductive or corrosive fluids. The threaded hub with milled slots permits easy mounting in areas where a hex body or wrench pad would be too large or where wrench installation is not practical.

FIGURE 1 (SPHERICAL POINT)

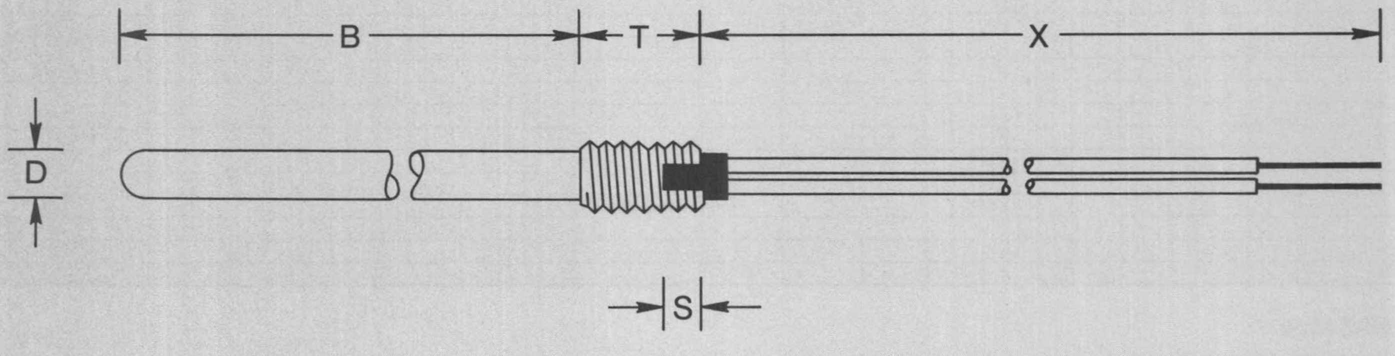


FIGURE 2 (FLAT, PLUG WELDED POINT)

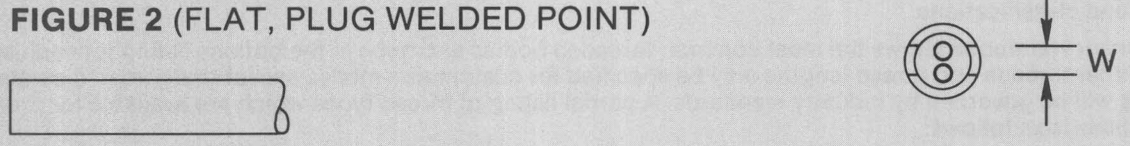
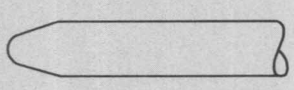


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

808 U.S. HIGHWAY #1• EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

		TUBING			THREADED HUB				EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MT'L	LENGTH "T"	THREAD TYPE	SLOT "W"	SLOT "S"	LENGTH "X"	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T5601	1	.022	1	24XX SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	125	B05 B07
T5602	1	.028	1	22TW SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	125	BR11 B10
T5603	1	.032	1-1/2	21TW SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	125	B10
T5604/A1	1	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	BR16 P20
T5604/B1	1	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	BR16 P20
T5605/A1	1	.0425	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	BR23 P25
T5605/B1	1	.0425	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	BR23 P25
T5606/A1	1	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	BR32 P30
T5606/A2	2	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	BR32 P30
T5606/B1	1	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	BR32 P30
T5606/B2	2	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	BR32 P30
T5607/A1	1	.072	2-1/2	15 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5607/A2	2	.072	2-1/2	15 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5607/B1	1	.072	2-1/2	15 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	BR42
T5607/B2	2	.072	2-1/2	15 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	BR42
T5608/A1	1	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	BR55 P60
T5608/A2	2	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	BR55 P60
T5608/B1	1	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	BR55 P60
T5608/B2	2	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	BR55 P60
T5609/A1	1	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P65
T5609/A2	2	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P65
T5609/A3	3	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P65
T5609/B1	1	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P65
T5609/B2	2	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P65
T5609/B3	3	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P65
T5610/A1	1	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P85
T5610/A2	2	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P85
T5610/A3	3	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P85
T5610/B1	1	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P85
T5610/B2	2	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P85
T5610/B3	3	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P85
T5611/A1	1	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P100 DC95
T5611/A2	2	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P100 DC95
T5611/A3	3	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P100 DC95
T5611/B1	1	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P100
T5611/B2	2	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P100
T5611/B3	3	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P100
						6-32									B05
T5600	1	.022	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	B07
SERIES	2	to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	B10
OPTIONS	3	.125				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	B14
						1/4-20				26	NPC	KYNAR		125	B35
										24	OFHC	FIBERGLASS		175	B43
						10-32				22	Ni	SIL. RUBBER		200	
						12-28				20		KAPTON		260	BR11
						1/4-28						POLYETHYLENE		300	BR16
															BR23
															BR32
															BR42
															BR55
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															MC50
															DC95
															SP's
															CTP's
															HTP's

SERIES T5700

STYLE: A series T5700 assembly consists of a thermistor attached to insulated hook-up wire and encapsulated into a small to medium sized open end tubing. The tubing is generally made of stainless steel, with other metals available, and is welded or brazed to a threaded hub having milled slots for insertion by means of a spanner wrench or tool. The thermistor may be completely encapsulated for maximum protection or may be partially exposed for fast response.

APPLICATION: The series T5700 assemblies may be used in many general temperature or control applications where mounting space is confined and mounting torques will be low. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for applications which involve conductive or corrosive fluids. The threaded hub with milled slots permits easy mounting in areas where a hex body or wrench pad would be too large or where wrench installation is not practical.

FIGURE 1

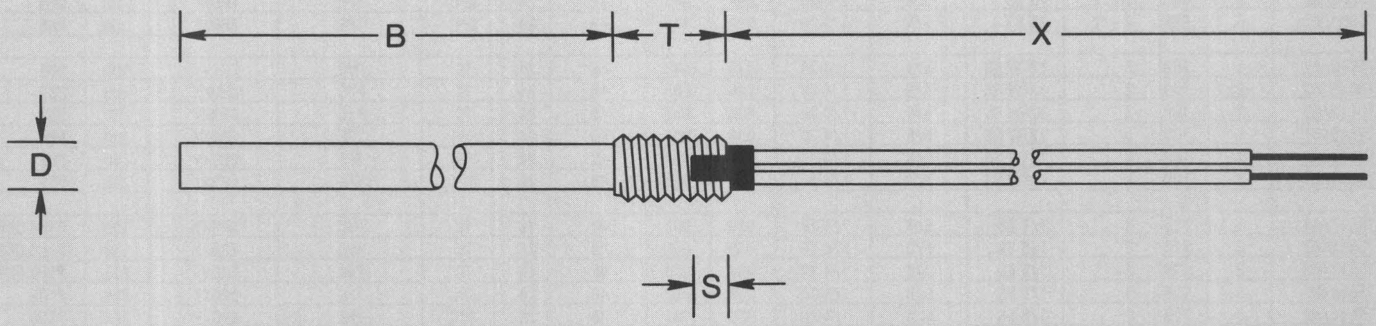
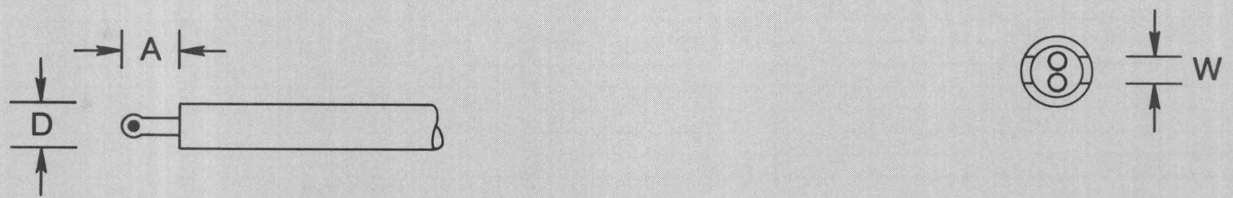


FIGURE 2



ASSEMBLY PREFIX	FIG.	TIP	TUBING			HUB (MACHINED)				EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA. "A"	DIA "D"	LENGTH "B"	MAT'L	LENGTH "T"	THREAD TYPE	SLOT "W"	SLOT "S"	LENGTH "X"	GA	ALLOY	INSUL.			
T5701	1	—	.022	1	24XX SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	105	B05 B07
T5702	1	—	.028	1	22TW SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	125	BR11 B10
T5703	1	—	.032	1-1/2	21TW SS	1/4	8-32	.031	.050	48	30	OFHC	KYNAR	EPOXY	125	BR14 B14
T5704/A1	1	—	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	P20 BR16
T5704/A2	2	.030	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	P20
T5704/B1	1	—	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P20 BR16
T5704/B2	2	.030	.0355	2-1/4	20TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P20
T5705/A1	1	—	.0425	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	P25 BR23
T5705/A2	2	.035	.0425	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	P25
T5705/B1	1	—	.0425	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P25 BR23
T5705/B2	2	.035	.0452	2-1/4	19TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P25
T5706/A1	1	—	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	TC	PVC	EPOXY	105	P30 BR32
T5706/A2	2	.040	.050	2-1/4	18TW SS	1/4	10-32	.031	050	48	28	TC	PVC	EPOXY	105	P30
T5706/B1	1	—	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P30 BR32
T5706/B2	2	.040	.050	2-1/4	18TW SS	1/4	10-32	.031	.050	48	28	SPC	TFE	EPOXY	200	P30
T5707/A1	1	—	.072	2-1/2	15 SS	5/8	1/4-20	.031	050	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5707/A2	2	.100	.072	2-1/2	15 SS	5/8	1/4-20	.031	.050	48	24	TC	PVC	EPOXY	105	P60
T5707/B1	1	—	.072	2-1/2	15 SS	5/8	1/4-20	.031	.050	48	24	SPC	TFE	EPOXY	200	BR42
T5707/B2	2	.100	.072	2-1/2	15 SS	5/8	1/4-20	.031	.050	48	24	SPC	TFE	EPOXY	200	P60
T5708/A1	1	—	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P60 BR55
T5708/A2	2	.100	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P60
T5708/B1	1	—	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P60 BR55
T5708/B2	2	.100	.083	2-1/2	14 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P60
T5709/A1	1	—	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P60 P65
T5709/A2	2	.100	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P60 P65
T5709/B1	1	—	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P60 P65
T5709/B2	2	.100	.095	2-1/2	13 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P60 P65
T5710/A1	1	—	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P85 FP's
T5710/A2	2	.100	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P85
T5710/B1	1	—	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5710/B2	2	.100	.109	3	12TW SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P85
T5711/A1	1	—	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P100 DC95
T5711/A2	2	.100	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	TC	PVC	EPOXY	105	P100
T5711/B1	1	—	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P100
T5711/B2	2	.100	.125	3	1/8 SS	5/8	1/4-20	.036	.063	48	24	SPC	TFE	EPOXY	200	P100
							6-32									
T5700	1	a/r	.022	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	B05
SERIES	2		to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	B07
OPTIONS			.125				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	B10
							1/4-20				26	NPC	KYNAR		125	B14
											24	OFHC	FIBERGLASS		175	B35
							10-32				22	Ni	SIL. RUBBER		200	B43
							12-28				20		KAPTON		260	
							1/4-28						POLYETHYLENE		300	BR11
																BR14
																BR16
																BR23
																BR32
																BR42
																BR55
																P20
																P25
																P30
																P60
																P65
																P85
																P100
																MC50
																DC95
																SP's
																FP's
																CTP's
																HTP's

SERIES T5800

STYLE: A series T5800 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into a closed end tubing. The tubing is closed in one of three basic shapes and is generally made of stainless steel, however, other metals and other closures are available upon special order. The tubing is welded or brazed to a threaded hub which has milled wrench flats.

APPLICATION: The series T5800 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum protection for the thermistor in harsh environments. The assemblies are particularly well suited for immersion applications in conductive or corrosive fluids. The threaded hub with wrench flats permits mounting with moderate torque and mounting in spaces where a hex body would be too large.

FIGURE 1 (SPHERICAL POINT)

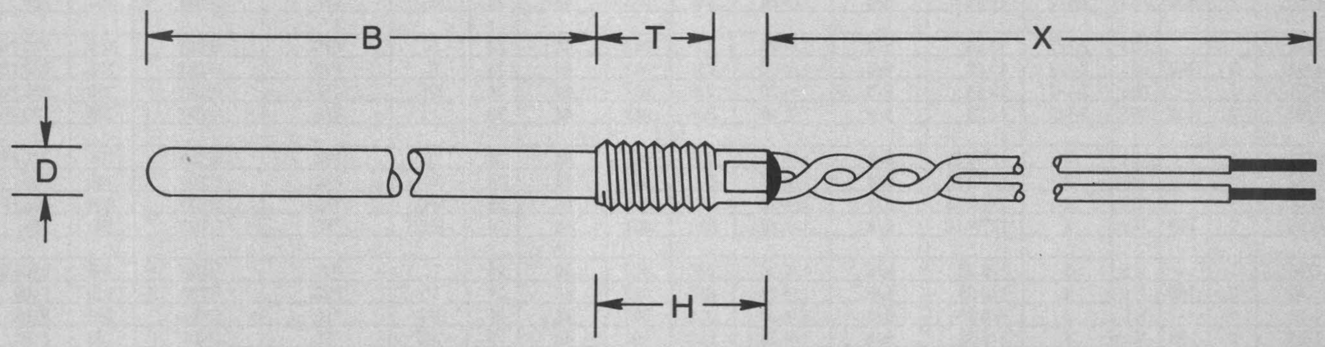
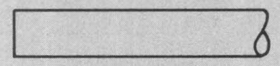


FIGURE 2 (FLAT, PLUG WELDED POINT)



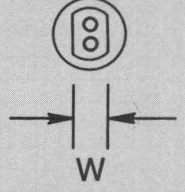
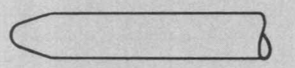


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING			THREADED HUB				EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	"W"	LENGTH "X"	GA	ALLOY	INSULATION			
T5801	1	.028	1	22TW SS	1/2	8-32	3/8	3/32	48	30	OFHC	KYNAR	EPOXY	125	BR11
T5802	1	.032	1-1/2	21TW SS	1/2	8-32	3/8	3/32	48	30	OFHC	KYNAR	EPOXY	125	BR14
T5803/A1	1	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P20 BR16
T5803/B1	1	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P20 BR16
T5804/A1	1	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P25 BR23
T5804/B1	1	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P25 BR23
T5805/A1	1	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P30 BR32
T5805/A2	2	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P30 BR32
T5805/B1	1	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P30 BR32
T5805/B2	2	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P30 BR32
T5806/A1	1	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5806/A2	2	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5806/B1	1	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	BR42
T5806/B2	2	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	BR42
T5807/A1	1	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOYX	105	P60 BR55
T5807/A2	2	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60 BR55
T5807/B1	1	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60 BR55
T5807/B2	2	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60 BR55
T5808/A1	1	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P65
T5808/A2	2	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P65
T5808/A3	3	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P65
T5808/B1	1	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P65
T5808/B2	2	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P65
T5808/B3	3	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P65
T5809/A1	1	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P85
T5809/A2	2	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P85
T5809/A3	3	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P85
T5809/B1	1	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P85
T5809/B2	2	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P85
T5809/B3	3	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P85
T5810/A1	1	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P100 DC95
T5810/A2	2	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P100 DC95
T5810/A3	3	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P100 DC95
T5810/B1	1	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P100
T5810/B2	2	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P100
T5810/B3	3	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P100
T5800	1	.028	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	2	to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS	3	.250				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	BR16
						1/4-20				26	NPC	KYNAR		125	BR23
						5/16-18				24	OFHC	FIBERGLASS		175	BR32
										22	Ni	SIL.RUBBER		200	BR42
						10-32				20		KAPTON		260	BR55
						12-28				18		POLYETHYLENE		300	
						1/4-28									
						5/16-24									P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															CTP's
															HTP's
															MC50
															DC95

SERIES T5900

STYLE: A series T5900 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into an open end tubing. The tubing is welded or brazed to a threaded hub which has milled wrench flats. The tubing is generally made of stainless steel, with brass or other metals available on special order. The thermistor may be completely encapsulated for maximum protection or may be partially exposed for fast response.

APPLICATION: The series T5900 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without further assembly or modifications. Please consult the factory for specific information regarding materials selection for such applications. The threaded hub with wrench flats permits mounting with moderate torque and mounting in spaces where a hex body would be too large.

FIGURE 1

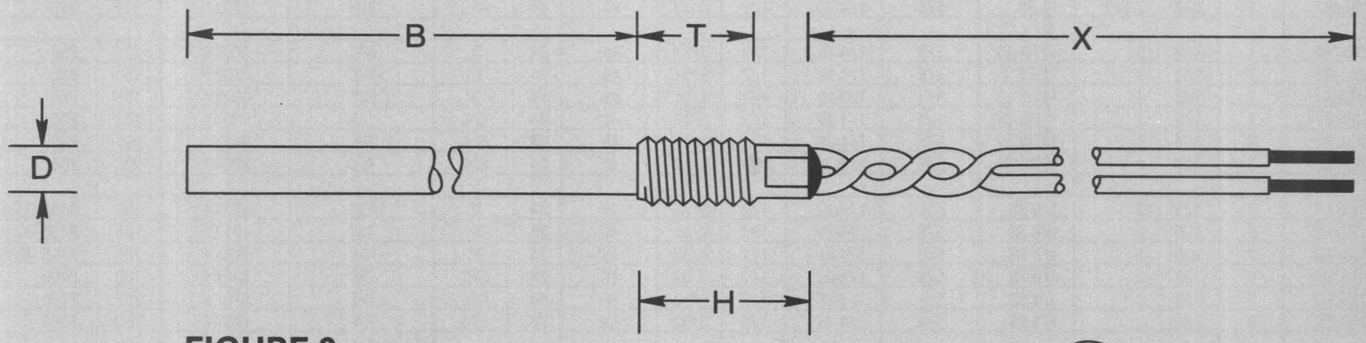
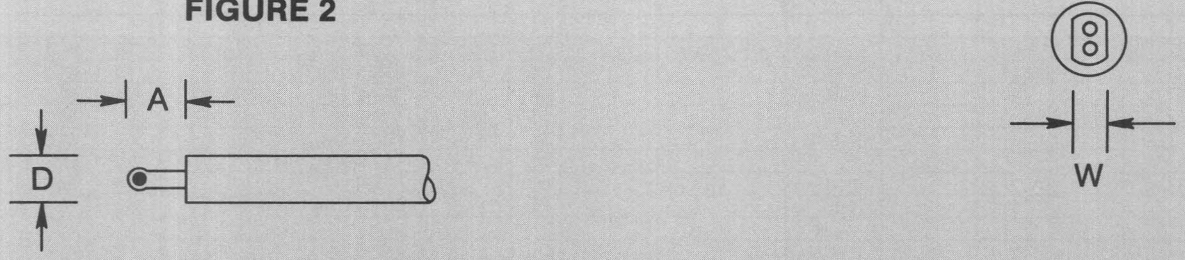


FIGURE 2



THERMOMETRICS INC.

		TIP	TUBING			THREADED HUB				EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA. "D1"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	THREAD "T"	"W"	LENGTH "X"	GA	ALLOY	INSUL.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T5901	1	—	.028	1	22TW SS	1/2	8-32	3/8	3/32	48	30	OFHC	KYNAR	EPOXY	125	BR11
T5902	1	—	.032	1-1/2	21TW SS	1/2	8-32	3/8	3/32	48	30	OFHC	KYNAR	EPOXY	125	BR14
T5903/A1	1	—	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P20 BR16
T5903/A2	2	.030	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P20
T5903/B1	1	—	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P20 BR16
T5903/B2	2	.030	.0355	2-1/4	20TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P20
T5904/A1	1	—	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P25 BR23
T5904/A2	2	.035	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P25
T5904/B1	1	—	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P25 BR23
T5904/B2	2	.035	.0425	2-1/4	19TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P25
T5905/A1	1	—	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P30 BR32
T5905/A2	2	.040	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	TC	PVC	EPOXY	105	P30
T5905/B1	1	—	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P30 BR32
T5905/B2	2	.040	.050	2-1/4	18TW SS	5/8	10-32	1/2	1/8	48	28	SPC	TFE	EPOXY	200	P30
T5906/A1	1	—	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	BR42 MC50
T5906/A2	2	.100	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60
T5906/B1	1	—	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	BR42
T5906/B2	2	.100	.072	2-1/2	15 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60
T5907/A1	1	—	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60 BR55
T5907/A2	2	.100	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60
T5907/B1	1	—	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60 BR55
T5907/B2	2	.100	.083	2-1/2	14 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60
T5908/A1	1	—	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60 P65
T5908/A2	2	.100	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P60 P65
T5908/B1	1	—	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60 P65
T5908/B2	2	.100	.095	2-1/2	13 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P60 P65
T5909/A1	1	—	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P85
T5909/A2	2	.100	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P85 FP's
T5909/B1	1	—	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P85
T5909/B2	2	.100	.109	3	12TW SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P85 FP's
T5910/A1	1	—	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P100 DC95
T5910/A2	2	.100	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	TC	PVC	EPOXY	105	P100
T5910/B1	1	—	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P100
T5910/B2	2	.100	.125	3	1/8 SS	5/8	1/4-20	1/2	5/32	48	24	SPC	TFE	EPOXY	200	P100
T5900	1	a/r	.028	a/r	SS304	a/r	8-32	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	2		to		BRASS		10-24				30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS			.250				12-24				28	SPC	TEFLON (FEP)	CERAMIC	105	BR16
							1/4-20				26	NPC	KYNAR		125	BR23
							5/16-18				24	OFHC	FIBERGLASS		175	BR32
											22	Ni	SIL. RUBBER		200	BR42
							10-32				20		KAPTON		260	BR55
							12-28				18		POLYETHYLENE		300	
							1/4-28									P20
							5/16-24									P25
																P30
																P60
																P65
																P85
																P100
																SP's
																CTP's
																HTP's
																FP's
																MC50
																DC95

SERIES T7000

STYLE: A series T7000 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wire and encapsulated into a closed end tubing. The tubing is generally made of stainless steel and is closed in one of three basic tip shapes, however, other metals or closures are available upon special order. The tubing is welded or brazed to a tapered thread pipe fitting with a hex body.

APPLICATION: The series T7000 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum protection for the thermistor and the tapered thread provides a leak-tight seal thus making the assemblies particularly well suited for applications in pressurized piping systems or vessels. Immersion in conductive or corrosive fluids presents no problems to these assemblies even at high pressure.

FIGURE 1 (SPHERICAL POINT)

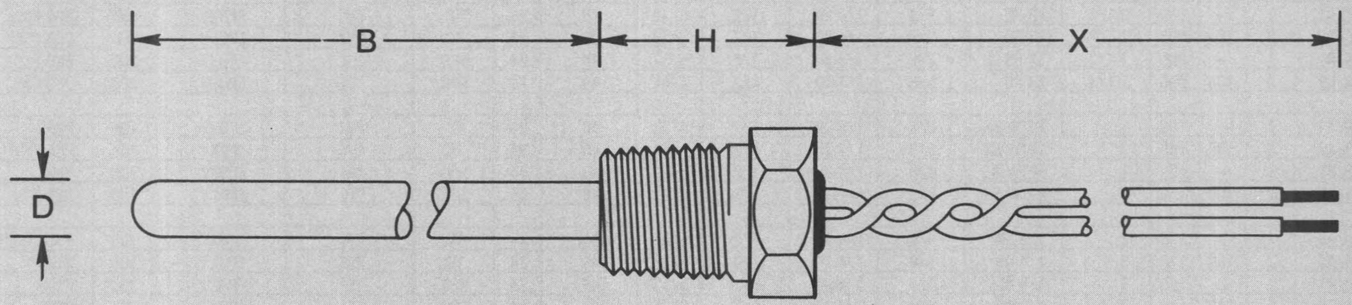
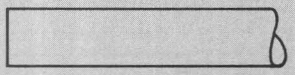


FIGURE 2 (FLAT, PLUG WELDED POINT)



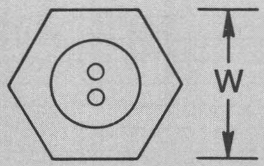


FIGURE 3 (TAPERED POINT)

		TUBING			THREADED HUB			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH X	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T7001/A1	1	.0355	1/2	20TW SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P20 BR16
T7001/B1	1	.0355	1/2	20TW SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P20 BR16
T7002/A1	1	.0425	1/2	19TW SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P25 BR23
T7002/B1	1	.0425	1/2	19TW SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P25 BR23
T7003/A1	1	.050	1/2	18TW SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P30 BR32
T7003/A2	2	.050	1/2	18TW SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P30 BR32
T7003/B1	1	.050	1/2	18TW SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P30 BR32
T7003/B2	2	.050	1/2	18TW SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P30 BR32
T7004/A1	1	.072	3/4	15 SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	BR42 MC50
T7004/A2	2	.072	3/4	15 SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	BR42 MC50
T7004/B1	1	.072	3/4	15 SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	BR42
T7004/B2	2	.072	3/4	15 SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	BR42
T7005/A1	1	.083	3/4	14 SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P60 BR55
T7005/A2	2	.083	3/4	14 SS	23/32	1/16-27	5/16	48	24	TC	PVC	EPOXY	105	P60 BR55
T7005/B1	1	.083	3/4	14 SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P60 BR55
T7005/B2	2	.083	3/4	14 SS	23/32	1/16-27	5/16	48	24	SPC	TFE	EPOXY	200	P60 BR55
T7006/A1	1	.095	1	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P65
T7006/A2	2	.095	1	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P65
T7006/A3	3	.095	1	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P65
T7006/B1	1	.095	1	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P65
T7006/B2	2	.095	1	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P65
T7006/B3	3	.095	1	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P65
T7007/A1	1	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85
T7007/A2	2	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85
T7007/A3	3	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85
T7007/B1	1	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85
T7007/B2	2	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85
T7007/B3	3	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85
T7008/A1	1	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 DC95
T7008/A2	2	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 DC95
T7008/A3	3	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 DC95
T7008/B1	1	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7008/B2	2	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7008/B3	3	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7009/A1	1	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7009/A2	2	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7009/A3	3	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7009/B1	1	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7009/B2	2	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7009/B3	3	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7010/A1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7010/A2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7010/A3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7010/B1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7010/B2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7010/B3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7011/A1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7011/A2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7011/A3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7011/B1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7011/B2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7011/B3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
														BR11
T7000	1	.028	a/r	SS304	23/32	1/16-27	5/16	a/r	32	TC	PVC	EPOXY	60	BR14
SERIES	2	to		BRASS	3/4	1/8-27	7/16		30	BC	TEFLON (TFE)	RTV	80	BR16
OPTIONS	3	.250			7/8	1/4-18	9/16		28	SPC	TEFLON (FEP)	CERAMIC	105	BR23
									26	NPC	KYNAR		125	BR32
									24	OFHC	FIBERGLASS		175	BR42
									22	Ni	SIL. RUBBER		200	BR55
									20		KAPTON		260	
									18		POLYETHYLENE		300	MC50
														DC95
														P20
														P25
														P30
														P60
														P65
														P85
														P100
														SP's
														CTP's
														HTP's

SERIES T7100

STYLE: A series T7100 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hookup wires and encapsulated into an open end tubing. The tubing is generally made of stainless steel, although other metals are available, and it is welded or brazed to a tapered thread pipe fitting with a hex body. The thermistor may be partially exposed for fast response or may be completely encapsulated for maximum protection.

APPLICATION: The series T7100 assemblies are extremely rugged sensor packages designed for use in applications where a leak-tight seal is required for low to moderate pressures. They are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids.

FIGURE 1

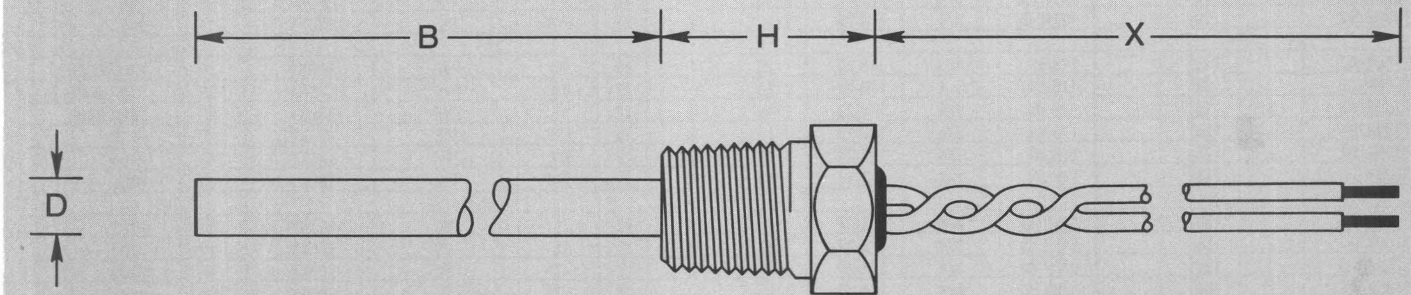
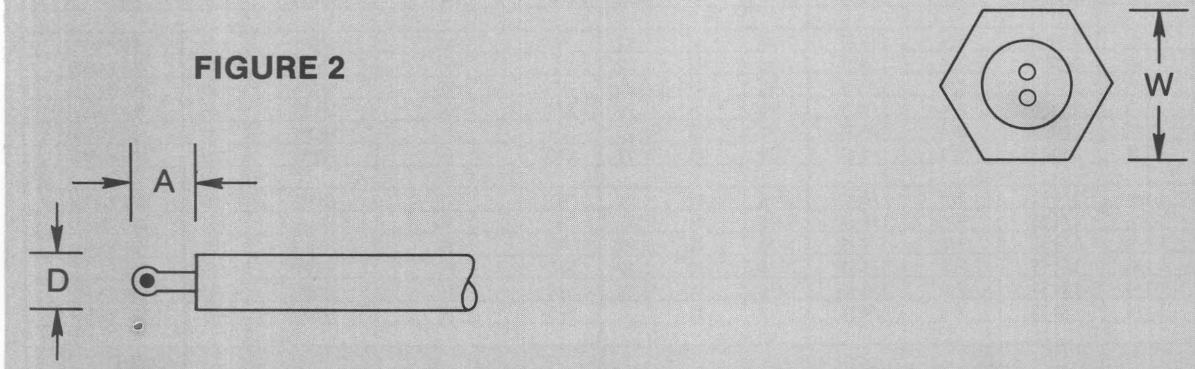


FIGURE 2



THERMOMETRICS INC.

808 U.S. HIGHWAY #1• EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

ASSEMBLY PREFIX	FIG.	TIP DIM "A"	TUBING			THREADED HUB			EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH "X"	GA	ALLOY	INSULATION			
T7101/A1	1	—	.095	1	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 P65
T7101/A2	2	.100	.095	1	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 P65
T7101/B1	1	—	.095	1	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 P65
T7101/B2	2	.100	.095	1	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 P65
T7102/A1	1	—	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85 FP
T7102/A2	2	.100	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85 FP
T7102/B1	1	—	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85 FP
T7102/B2	2	.100	.109	1	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85 FP
T7103/A1	1	—	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7103/A2	2	.100	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7103/B1	1	—	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7103/B2	2	.100	.125	1	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7104/A1	1	—	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7104/A2	2	.100	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7104/B1	1	—	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7104/B2	2	.100	.156	1	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7105/A1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7105/A2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7105/B1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7105/B2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7106/A1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7106/A2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7106/B1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7106/B2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7100	1	a/r	.028	a/r	SS304	23/32	1/16-27	5/16	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	2		to		BRASS	3/4	1/8-27	7/16		30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS			.250			7/8	1/4-18	9/16		28	SPC	TEFLON (FEP)	CERAMIC	105	BR16
										26	NPC	KYNAR		125	BR23
										24	OFHC	FIBERGLASS		175	BR32
										22	Ni	SIL. RUBBER		200	BR42
										20		KAPTON		260	BR55
										18		POLYETHYLENE		300	
															MC50
															DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															FP's
															SP's
															CTP's
															HTP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

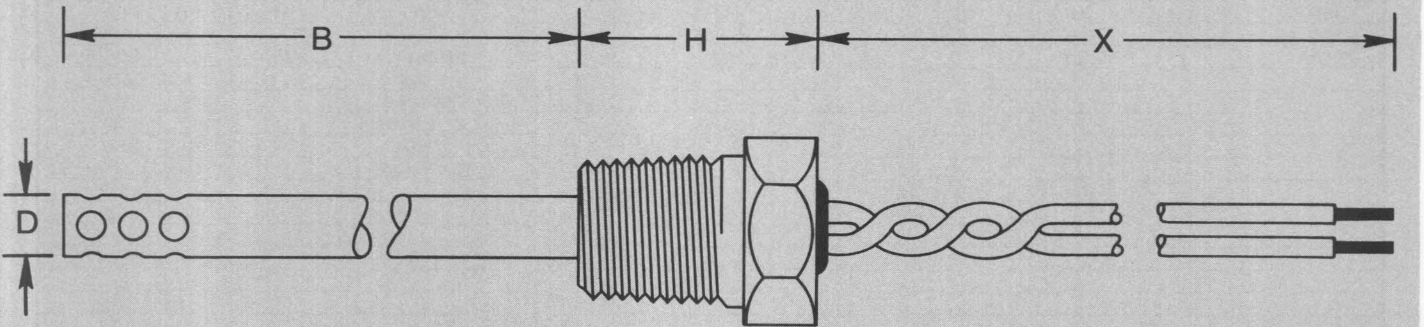
OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

SERIES T7200

STYLE: A series T7200 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wires and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is generally made of stainless steel, although other metals are available, and it is welded or brazed to a tapered thread pipe fitting with a hex body. The thermistor is recessed into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T7200 assemblies are extremely rugged sensor packages designed for use in applications where fast response as well as mechanical protection are important and where a leak-tight seal is required for low to moderate pressures. The assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids.

FIGURE 1



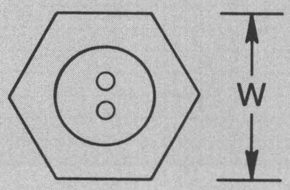


FIGURE 2

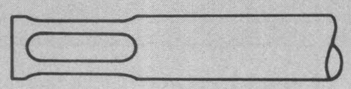
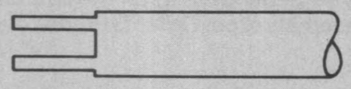


FIGURE 3



THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

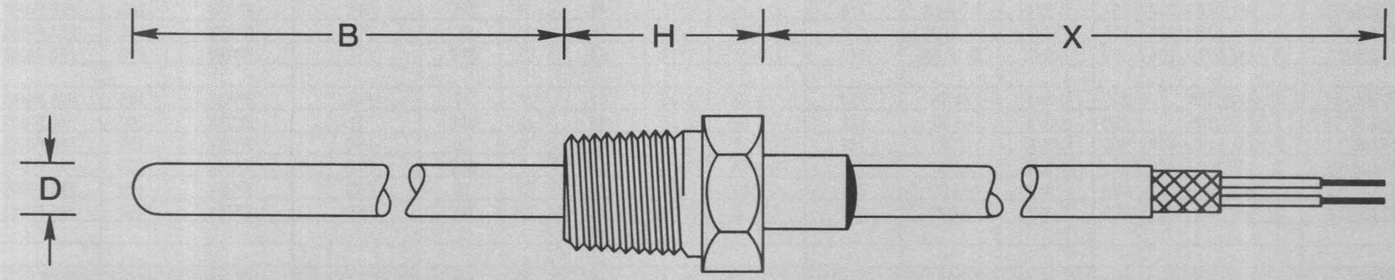
		TIP	TUBING			THREADED HUB			EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	OPENING DIM.	DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH "X"	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T7201/A1	1	(12) x .031	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 P65
T7201/B1	1	(12) x .031	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 P65
T7201/C1	2	(4) .031 x .125	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 P65
T7201/D1	2	(4) .031 x .125	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 P65
T7201/E1	3	(4) .031 x .093	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 P65
T7201/F1	3	(4) .031 x .093	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 P65
T7202/A1	1	(12) x .036	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85 FP's
T7202/B1	1	(12) x .036	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85 FP's
T7202/C1	2	(4) .036 x .140	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85 FP's
T7202/D1	2	(4) .036 x .140	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85 FP's
T7202/E1	3	(4) .036 x .110	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P85 FP's
T7202/F1	3	(4) .036 x .110	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P85 FP's
T7203/A1	1	(12) x .047	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 FP's
T7203/B1	1	(12) x .047	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100 FP's
T7203/C1	2	(4) .047 x .187	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 FP's
T7203/D1	2	(4) .047 x .187	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100 FP's
T7203/E1	3	(4) .047 x .141	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100 FP's
T7203/F1	3	(4) .047 x .141	.125	1-1/4	1/8 sS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100 FP's
T7204/A1	1	(12) x .062	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7204/B1	1	(12) x .062	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7204/C1	2	(4) .062 x .250	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7204/D1	2	(4) .062 x .250	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7204/E1	3	(4) .062 x .187	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P100
T7204/F1	3	(4) .062 x .187	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P100
T7205/A1	1	(12) .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7205/B1	1	(12) .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7205/C1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7205/D1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7205/E1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	TC	PVC	EPOXY	105	P60 PAIRS
T7205/F1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	22	SPC	TFE	EPOXY	200	P60 PAIRS
T7206/A1	1	(12) .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7206/B1	1	(12) .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7206/C1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7206/D1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7206/E1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	TC	PVC	EPOXY	105	P85 PAIRS
T7206/F1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	22	SPC	TFE	EPOXY	200	P85 PAIRS
T7200	1	a/r	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	2		to		BRASS	3/4	1/8-27	7/16		30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS	3		.250			7/8	1/4-18	9/16		28	SPC	TEFLON (FEP)	CERAMIC	105	BR16
										26	NPC	KYNAR		125	BR23
										24	OFHC	FIBERGLASS		175	BR32
										22	Ni	SIL. RUBBER		200	BR42
										20		KAPTON		260	BR55
										18		POLYETHYLENE		300	
															MC50
															DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															FP's
															SP's
															CTP's
															HTP's

SERIES T7300

STYLE: A series T7300 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable encapsulated into a closed end tubing. The tubing is generally stainless steel and is closed in one of three basic tip shapes, however, other metals or closures are available upon special order. The tubing is welded or brazed to a tapered thread pipe fitting with a hex body.

APPLICATION: The series T7300 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum mechanical protection for the thermistor and the shielded cable provides interference protection. The tapered thread provides a leak-tight seal which makes the assemblies ideally suited for applications in pressurized piping systems or vessels. The assemblies may be used in conductive or corrosive fluids even at high pressure.

FIGURE 1 (SPHERICAL POINT)



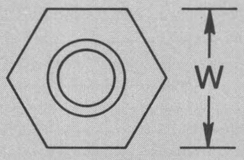


FIGURE 2 (FLAT, PLUG WELDED POINT)

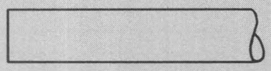
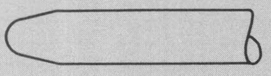


FIGURE 3 (TAPERED POINT)



THERMOMETRICS INC.

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ASSEMBLY PREFIX	FIG.	TUBING			THREADED HUB			SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH "X"	# COND	GA	ALLOY	INSULATION			
T7301/A1	1	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7301/A2	2	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7301/A3	3	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7301/B1	1	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7301/B2	2	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7301/B3	3	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7302/A1	1	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T7302/A2	2	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T7302/A3	3	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T7302/B1	1	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T7302/B2	2	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T7302/B3	3	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T7303/A1	1	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T7303/A2	2	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T7303/A3	3	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T7303/B1	1	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7303/B2	2	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7303/B3	3	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7304/A1	1	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7304/A2	2	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7304/A3	3	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7304/B1	1	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7304/B2	2	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7304/B3	3	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7305/A1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7305/A2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7305/A3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7305/B1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7305/B2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7305/B3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7306/A1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7306/A2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7306/A3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7306/B1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7306/B2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7306/B3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7300	1	.028	a/r	SS304	23/32	1/6-27	5/16	a/r	1 + S	32	TC	PVC	EPOXY	60	BR11
SERIES	2	to		BRASS	3/4	1/8-27	7/16		2	30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS	3	.250			7/8	1/4-18	9/16		3	28	SPC	TEFLON (FEP)		105	BR16
									4	26	NPC	POLYETHYLENE		175	BR23
										24	SCCW	SIL. RUBBER		200	BR32
									RG	22	BCW	NEOPRENE		260	BR42
										20					BR55
															MC50
															DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															CTP's

SERIES T7400

STYLE: A series T7400 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing. The tubing is generally made of stainless steel, although other materials are available, and it is welded or brazed to a tapered thread pipe fitting with a hex body. The themistor may be partially exposed for fast response or may be completely encapsulated for maximum protection.

APPLICATION: The series T7400 assemblies are extremely rugged sensor packages designed for use in applications where a leak-tight seal is required for low to moderate pressures and a shielded cable is required for interference protection. They are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids.

FIGURE 1

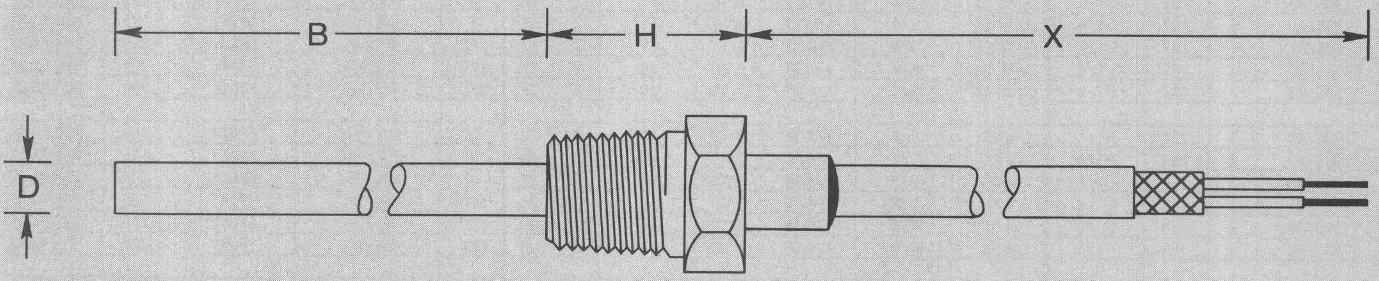
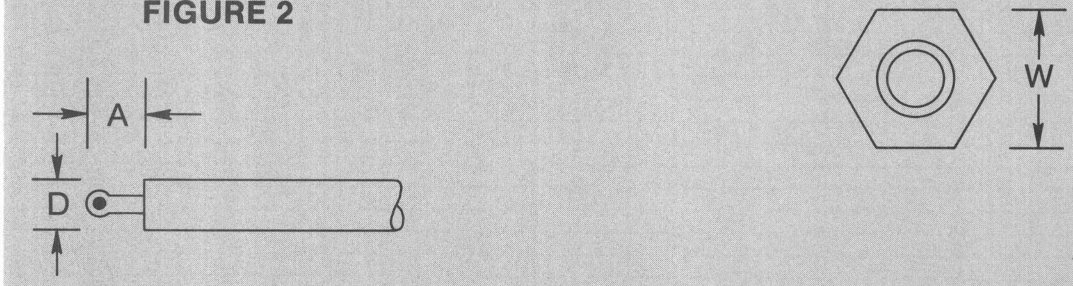


FIGURE 2



THERMOMETRICS INC.

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ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	TUBING			THREADED HUB			SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH "X"	# COND	GA	ALLOY	INSUL./JKT.			
T7401/A1	1	—	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7401/A2	2	.100	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7401/B1	1	—	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7401/B2	2	.100	.095	1	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7402/A1	1	—	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85
T7402/A2	2	.100	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T7402/B1	1	—	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85
T7402/B2	2	.100	.109	1	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T7403/A1	1	—	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 DC95
T7403/A2	2	.100	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7403/B1	1	—	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7403/B2	2	.100	.125	1	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7404/A1	1	—	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7404/A2	2	.100	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7404/B1	1	—	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7404/B2	2	.100	.156	1	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7405/A1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7405/A2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7405/B1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7405/B2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7406/A1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7406/A2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7406/B1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7406/B2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7400	1	a/r	.028	a/r	SS304	23/32	1/6-27	5/16	a/r	1 + S	32	TC	PVC	EPOXY	60	BR11
SERIES	2		to		BRASS	3/4	1/8-27	7/16		2	30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS			.250			7/8	1/4-18	9/16		3	28	SPC	TEFLON (FEP)		105	BR16
										4	26	NPC	POLYETHYLENE		175	BR23
											24	SCCW	SIL. RUBBER		200	BR32
										RG	22	BCW	NEOPRENE		260	BR42
											20					BR55
																MC50
																DC95
																P20
																P25
																P30
																P60
																P65
																P85
																P100
																SP's
																FP's
																CTP's

TUBING: BRASS

Brass tubing is available in fractional sizes of 1/16" to 1/4" diameter with the wall thickness being 1/64" or 1/32". The most commonly specified alloy is #330. Special precision tubing diameters and wall thicknesses ranging from .012" to .065" (as appropriate) may be available on special order. The basic sizes of alloy #330 which are commonly used are as follows:

O.D. (REF.)	I.D. (REF.)	WALL (REF.)
(1/16) .0625	.0313	.0156
(3/32) .0938	.0625	.0156
(1/8) .125	.0625	.0313
(5/32) .1563	.0938	.0313
(3/16) .1875	.125	.0313
(7/32) .2188	.1563	.0313
(1/4) .250	.1875	.0313

SERIES T7500

STYLE: A series T7500 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is generally made of stainless steel, although other metals are available and it is welded or brazed to a tapered thread pipe fitting with a hex body. The thermistor is recessed into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T7500 assemblies are extremely rugged sensor packages designed for use in application where fast response, mechanical protection and interference protection are important. The tapered thread provides a leak-tight seal for the assembly which makes them suitable for applications involving low to moderate pressures. The assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids.

FIGURE 1

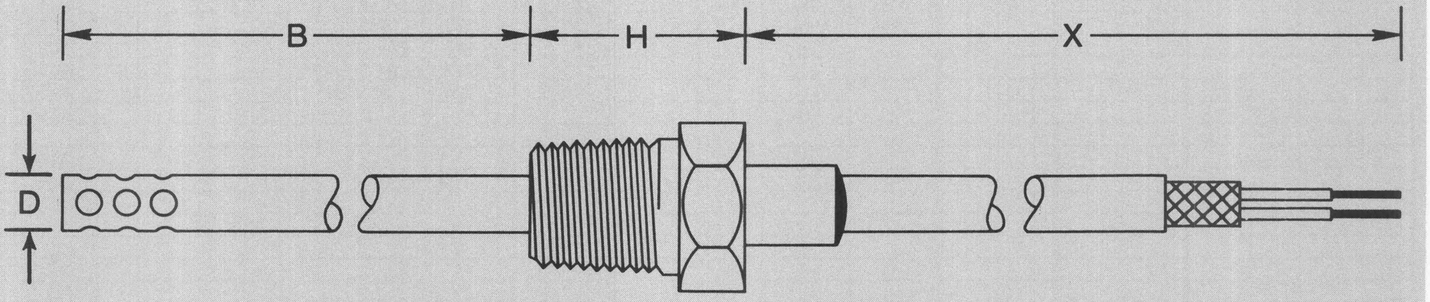
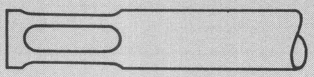


FIGURE 2



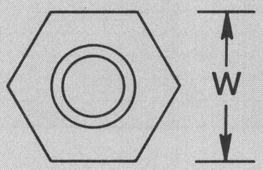
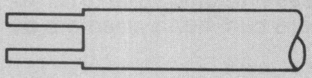


FIGURE 3



THERMOMETRICS INC.

808 U.S. HIGHWAY #1• EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			THREADED HUB			SHIELDED/JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	LENGTH "X"	#	GA	ALLOY	INSUL./JKT.			
T7501/A1	1	(12) x .031	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7501/B1	1	(12) x .031	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7501/C1	2	(4) .031 x .125	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7501/D1	2	(4) .031 x .125	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7501/E1	3	(4) .031 x .093	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 P65
T7501/F1	3	(4) .031 x .093	.095	1-1/4	13 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 P65
T7502/A1	1	(12) x .036	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T7502/B1	1	(12) x .036	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T7502/C1	2	(4) .036 x .140	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T7502/D1	2	(4) .036 x .140	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T7502/E1	3	(4) .036 x .110	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P85 FP's
T7502/F1	3	(4) .036 x .110	.109	1-1/4	12TW SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P85 FP's
T7503/A1	1	(12) .047	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 FP's
T7503/B1	1	(12) x .047	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100 FP's
T7503/C1	2	(4) .047 x .187	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 FP's
T7503/D1	2	(4) .047 x .187	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100 FP's
T7503/E1	3	(4) .047 x .141	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100 FP's
T7503/F1	3	(4) .047 x .141	.125	1-1/4	1/8 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100 FP's
T7504/A1	1	(12) x .062	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7504/B1	1	(12) x .062	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7504/C1	2	(4) .062 x .250	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7504/D1	2	(4) .062 x .250	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7504/E1	3	(4) .062 x .187	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P100
T7504/F1	3	(4) .062 x .187	.156	1-1/4	5/32 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P100
T7505/A1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7505/B1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7505/C1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7505/D1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7505/E1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T7505/F1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	2	22	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T7506/A1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7506/B1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7506/C1	2	(4) .109x.437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7506/D1	2	(4) .109x.437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7506/E1	3	(4) .109x.327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T7506/F1	3	(4) .109x.327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	2	20	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T7500	1	a/r	.095	a/r	SS304	23/32	1/6-27	5/16	a/r	1 + S	32	TC	PVC	EPOXY	60	BR11
SERIES	2		to		BRASS	3/4	1/8-27	7/16		2	30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS	3		.250			7/8	1/4-18	9/16		3	28	SPC	TEFLON (FEP)		105	BR16
										4	26	NPC	POLYETHYLENE		175	BR23
											24	SCCW	SIL. RUBBER		200	BR32
										RG	22	BCW	NEOPRENE		260	BR42
											20					BR55
																MC50
																P20
																P25
																P30
																P60
																P65
																P85
																P100
																FP's
																SP's
																CTP's

SERIES T8000

STYLE: A series T8000 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wires and encapsulated into a closed end tubing. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are constructed of stainless steel and the tubing is closed in one of three basic tip shapes. Other materials or tip closures are available upon special order.

APPLICATION: The series T8000 assemblies are extremely rugged sensor packages that provide maximum protection for the thermistor as well as the extension leads. The assemblies are suitable for immersion in conductive or corrosive fluids up to the transition hub. The armored sheath provides mechanical protection for the extension leads in applications involving heavy, moving machinery or where the leads may be subjected to cutting, pinching, abrasion or other severe environments.

FIGURE 1 (SPHERICAL POINT)

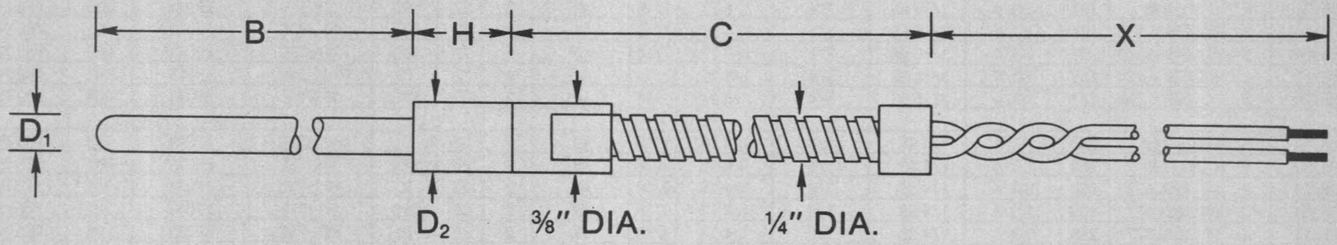


FIGURE 2 (FLAT, PLUG WELDED POINT)

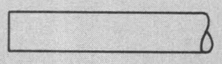
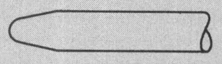


FIGURE 3 (TAPERED POINT)



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		TUBING			HUB		ARMORED	EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D1"	LENGTH "B"	MT'L	LENGTH "H"	DIA. "D2"	SHEATH "C"	LENGTH "X"	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8001/A1	1	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8001/A2	2	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8001/A3	3	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8001/B1	1	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8001/B2	2	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8001/B3	3	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8002/A1	1	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8002/A2	2	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8002/A3	3	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8002/B1	1	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8002/B2	2	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8002/B3	3	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8003/A1	1	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8003/A2	2	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8003/A3	3	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8003/B1	1	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8003/B2	2	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8003/B3	3	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8000	1	.095	a/r	SS304	a/r	.375	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2	to		BRASS		.500			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3	.250							28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
									26	NPC	FIBERGLASS		125	
									24	OFHC	KYNAR		175	MC50
									22	Ni	SIL. RUBBER		200	DC95
									20		KAPTON		260	
											POLYETHYLENE		300	P60
														P65
														P85
														P100
														SP's
														CTP's
														HTP's

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
18
20
22
24
26
28
30
32

CONSTRUCTION:
SOLID
STRANDED

ALLOYS:
BARE COPPER
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
OFHC COPPER
NICKEL
DUMET

INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
SILICONE RUBBER
POLYIMIDE
FIBERGLASS
POLYETHYLENE
POLYALKENE
FLUOROCARBON/POLYIMIDE
KYNAR
TEFZEL

SERIES T8100

STYLE: A series T8100 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wires and encapsulated into an open end tubing. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are constructed of stainless steel. Other materials are available upon special order. The thermistor may be completely encapsulated for maximum protection or may be partially exposed for fast response.

APPLICATION: The series T8100 assemblies are extremely rugged sensor packages that provide maximum protection for the extension leads and provide the fast response times of the open tip assembly. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without additional assembly or modifications. The armored sheath provides mechanical protection for the extension leads in applications involving heavy, moving machinery or where the leads may be subjected to cutting, pinching, abrasion or other severe environments. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1

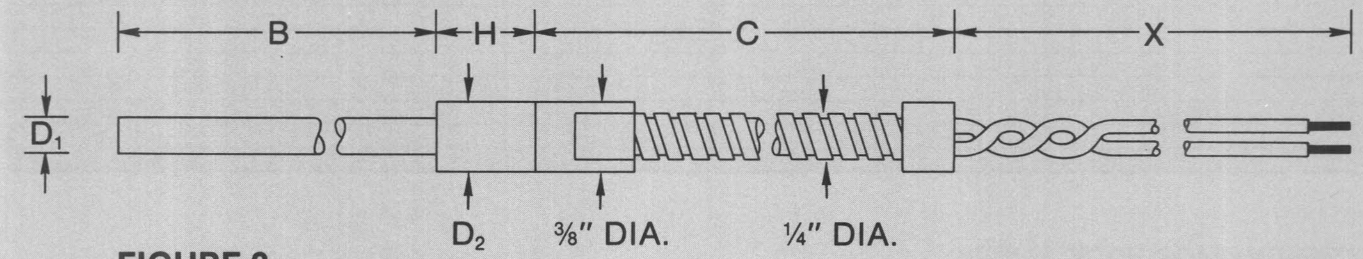
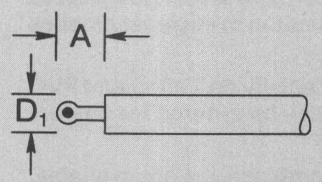


FIGURE 2



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIB.	TIP DIM. "A"	TUBING			HUB		ARMORED SHEATH "C"	EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	DIA. "D$_2$"		LENGTH "X"	GA	ALLOY	INSULATION			
T8101/A1	1	—	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8101/A2	2	.100	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8101/B1	1	—	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8101/B2	2	.100	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8102/A1	1	—	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8102/A2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8102/B1	1	—	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8102/B2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8103/A1	1	—	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8103/A2	2	.100	.250	6	1/4 SS	1	.500	48	12	22	PC	PVC	EPOXY	105	P85 PAIRS
T8103/B1	1	—	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8103/B2	2	.100	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8100	1	a/r	.095	a/r	SS304	a/r	.375	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS		.500			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS			.250							28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
										26	NPC	FIBERGLASS		125	
										24	OFHC	KYNAR		175	MC50
										22	Ni	SIL. RUBBER		200	DC95
										20		KAPTON		260	
												POLYETHYLENE		300	P60
															P65
															P85
															P100
															SP's
															CTP's
															HTP's
															FP's

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
18
20
22
24
26
28
30
32

CONSTRUCTION:
SOLID
STRANDED

ALLOYS:
BARE COPPER
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
OFHC COPPER
NICKEL
DUMET

INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
SILICONE RUBBER
POLYIMIDE
FIBERGLASS
POLYETHYLENE
POLYALKENE
FLUOROCARBON/POLYIMIDE
KYNAR
TEFZEL

SERIES T8150

STYLE: A series T8150 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated hook-up wires and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are constructed of stainless steel. Other materials are available upon special order. The thermistor is recessd into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T8150 assemblies are extremely rugged sensor packages designed for use in applications where fast response as well as maximum protection for the thermistor and extension leads are required. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without additional assembly or modifications. The armored sheath provides mechanical protection for the extension leads in applications involving heavy, moving machinery or where the leads may be subjected to cutting, pinching, abrasion or other severe environments. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1

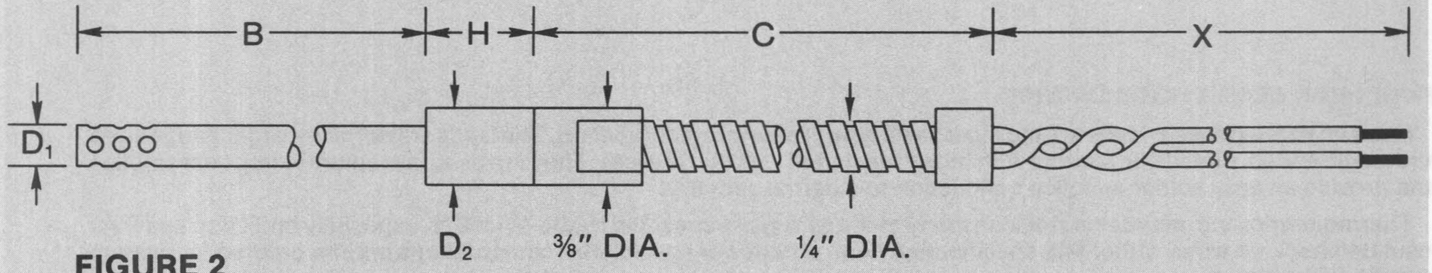


FIGURE 2

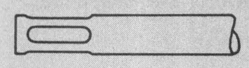
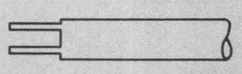


FIGURE 3



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			HUB		ARMORED SHEATH "C"	EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D1"	LENGTH "B"	MT'L	LENGTH "H"	DIA. "D2"		LENGTH "X"	GA	ALLOY	INSULATION			
T8151/A1	1	(12) x .047	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8151/B1	1	(12) x .047	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8151/C1	2	(4) .047 x .187	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8151/D1	2	(4) .047 x .187	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8151/E1	3	(4) .047 x .141	.125	3	1/8 SS	3/4	.375	48	12	28	TC	PVC	EPOXY	105	P100
T8151/F1	3	(4) .047 x .141	.125	3	1/8 SS	3/4	.375	48	12	28	SPC	TFE	EPOXY	200	P100
T8152/A1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8152/B1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8152/C1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8152/D1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8152/E1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8152/F1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8153/A1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8153/B1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8153/C1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8153/D1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8153/E1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8153/F1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8150	1	a/r	.095	a/r	SS304	a/r	.375	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS		.500			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3		.250							28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
										26	NPC	FIBERGLASS		125	
										24	OFHC	KYNAR		175	MC50
										22	Ni	SIL. RUBBER		200	DC95
										20		KAPTON		260	
												POLYETHYLENE		300	P60
															P65
															P85
															P100
															SP's
															CTP's
															HTP's
															FP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

SERIES T8200

STYLE: A series T8200 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into a closed end tubing. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are constructed of stainless steel and the tubing is closed in one of three basic tip shapes. Other materials or tip closures are available upon special order.

APPLICATION: The series T8200 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing and the armored sheath provide maximum mechanical protection for the thermistor and cable. The assemblies are suitable for immersion in conductive or corrosive fluids up to the transition hub. The assemblies are well suited for applications where heavy, moving machinery or severe environments could damage the extension cable.

FIGURE 1 (SPHERICAL POINT)

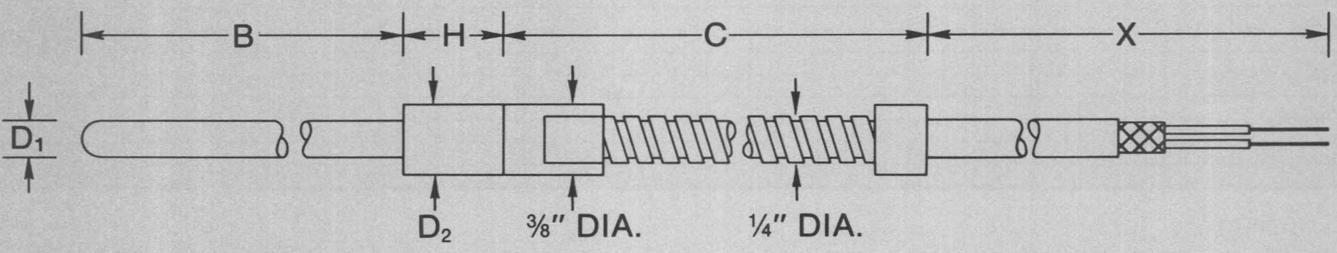


FIGURE 2 (TAPERED POINT)

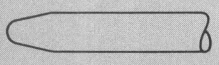


FIGURE 3 (FLAT PLUG WELDED POINT)

THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TUBING			HUB		ARMORED	SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
		DIA "D_1"	LENGTH "B"	MT'L	LENGTH "H"	DIA "D_2"	SHEATH "C"	LENGTH "X"	# COND.	GA	ALLOY	INSUL/JKT			
T8201/A1	1	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/A2	2	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/A3	3	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/B1	1	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8201/B2	2	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8201/B3	3	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8201/C1	1	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/C2	2	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/C3	3	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8201/D1	1	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8201/D2	2	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8201/D3	3	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8202/A1	1	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/A2	2	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/A3	3	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/B1	1	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8202/B2	2	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8202/B3	3	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8202/C1	1	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/C2	2	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/C3	3	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8202/D1	1	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8202/D2	2	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8202/D3	3	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8200	1	.095	a/r	SS304	a/r	.375	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2	to		BRASS		.500			2	30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3	.250							3	28	SPC	TEFLON (FEP)		105	BR55
									4	26	NPC	POLYETHYLENE		175	
										24	SCCW	SIL. RUBBER		200	MC50
									RG	22	BCW	NEOPRENE		260	DC95
										20					
															P60
															P65
															P85
															P100
															SP's
															CTP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

SERIES T8300

STYLE: A series T8300 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are constructed of stainless steel. Other materials are available upon special order. The thermistor may be completely encapsulated for maximum protection or may be partially exposed for fast response.

APPLICATION: The series T8300 assemblies are extremely rugged sensor packages that provide the fast response times of the open tip assemblies and provide maximum protection for the extension cable. These assemblies are not suitable for direct immersion in conductive or corrosive fluids without additional assembly or modifications. The armored sheath protects the extension cable in applications involving heavy, moving machinery or where the cable is exposed to cutting, pinching, abrasion or severe environments. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids.

FIGURE 1

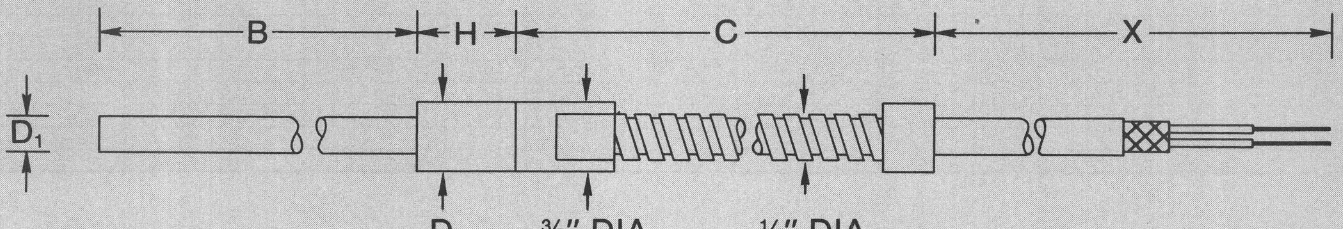
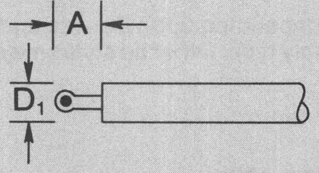


FIGURE 2



THERMOMETRICS INC.

		TIP	TUBING					ARMORED	SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA. "D1"	LENGTH "B"	MT'L	LENGTH "H"	DIA. "D2"	SHEATH "C"	LENGTH "X"	# COND	GA	ALLOY	INSUL/JKT	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8301/A1	1	—	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8301/A2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8301/B1	1	—	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8301/B2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8301/C1	1	—	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8301/C2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8301/D1	1	—	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8301/D2	2	.100	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8302/A1	1	—	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8302/A2	2	.100	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8302/B1	1	—	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8302/B2	2	.100	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8302/C1	1	—	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8302/C2	2	.100	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8302/D1	1	—	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8302/D2	2	.100	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8300	1	a/r	.095	a/r	SS304	a/r	.375	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS		.500			2	30	BC	TEFLON (TFE)	RTV	80	BR42
			.250							3	28	SPC	TEFLON (FEP)		105	BR55
										4	26	NPC	POLYETHYLENE		175	
											24	SCCW	SIL. RUBBER		200	MC50
										RG	22	BCW	NEOPRENE		260	DC95
											20					
																P60
																P65
																P85
																P100
																SP's
																CTP's
																FP's

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
- 20
- 22
- 24
- 26
- 28
- 30
- 32

CONSTRUCTION:
- RG CABLE
- 1 CONDUCTOR + SHIELD
- 2 CONDUCTORS W/ - OR - W/O SHIELD
- 3 CONDUCTORS W/ - OR - W/O SHIELD
- 4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:
- BARE COPPER
- COPPERWELD
- TINNED COPPER
- SILVER PLATED COPPER
- NICKEL PLATED COPPER
- SILVER CLAD COPPERWELD

INSULATIONS:
- TEFLON - TFE
- TEFLON - FEP
- POLYVINYL CHLORIDE - PVC
- POLYETHYLENE
- POLYPROPYLENE
- NEOPRENE
- SILICONE RUBBER
- FIBERGLASS

SERIES T8350

STYLE: A series T8350 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor shielded and insulated cable and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is welded or brazed to a machined adapter hub that connects an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are constructed of stainless steel. Other materials are available on special order. The thermistor is recessed into the slotted or drilled tip to provide both protection and fast response.

APPLICATION: The series T8350 assemblies are extremely rugged sensor packages designed for use in applications requiring fast response as well as maximum protection for the thermistor and extension cable. The assemblies are not suitable for direct immersion in conductive or corrosive fluids without additional assembly or modifications. Please consult the factory for specific information regarding materials selection for applications involving conductive or corrosive fluids. The armored sheath provides mechanical protection for the extension cable in applications where the cable is exposed to cutting, pinching, abrasion or severe environments.

FIGURE 1

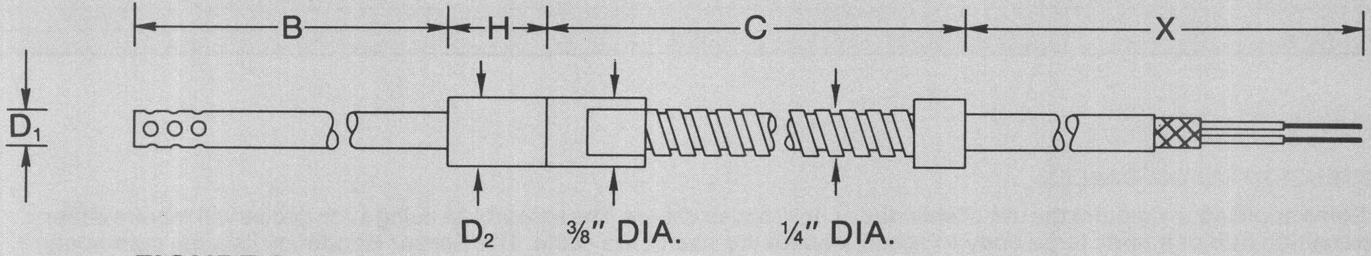


FIGURE 2

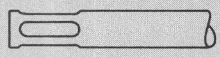


FIGURE 3

THERMOMETRICS INC.

		TIP	TUBING			HUB		ARMORED	SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	OPENING DIM.	DIA. "D_1"	LENGTH "B"	MT'L	LENGTH "H"	DIA. "D_2"	SHEATH "C"	LENGTH "X"	#	GA	ALLOY	INSUL/JKT	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8351/A1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/B1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8351/C1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/D1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8351/E1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/F1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8351/G1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/H1	1	(12) x .078	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8351/J1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/K1	2	(4) .078 x .312	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8351/L1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8351/M1	3	(4) .078 x .234	.187	4	3/16 SS	3/4	.375	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8352/A1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/B1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8352/C1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/D1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8352/E1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/F1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8352/G1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/H1	1	(12) x .109	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8352/J1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/K1	2	(4) .109 x .437	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8352/L1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8352/M1	3	(4) .109 x .327	.250	6	1/4 SS	1	.500	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8350	1	a/r	.095	a/r	SS304	a/r	.375	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS		.500			2	30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3		.250							3	28	SPC	TEFLON (FEP)		105	BR55
										4	26	NPC	POLYETHYLENE		175	
											24	SCCW	SIL. RUBBER		200	MC50
										RG	22	BCW	NEOPRENE		260	DC95
											20					
																P60
																P65
																P85
																P100
																SP's
																CTP's
																FP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

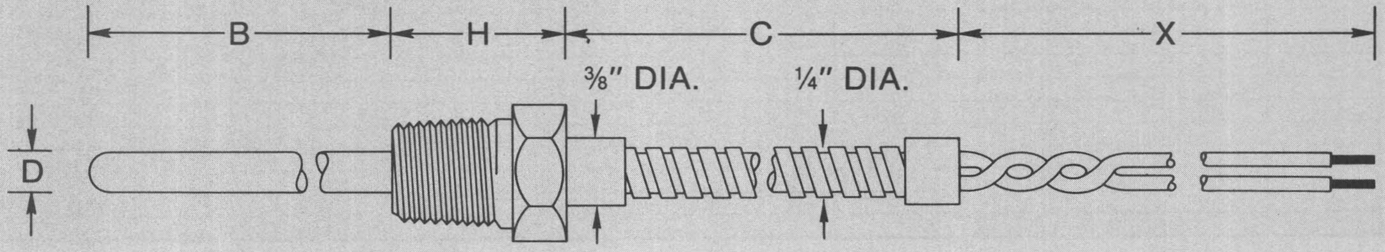
The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

SERIES T8400

STYLE: A series T8400 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated extension leads, and encapsulated into a closed end tubing. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are made of stainless steel and the tubing closure is in one of three basic shapes. Other materials or closures are available upon special order.

APPLICATION: The series T8400 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum protection for the thermistor and the tapered thread provides a leak-tight seal thus making these assemblies particularly well suited for applications in pressurized piping systems or vessels. Immersion in conductive or corrosive fluids, even at high pressures, presents no problems to these assemblies. The armored sheath provides maximum protection for the extension leads in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1 (SPHERICAL POINT)



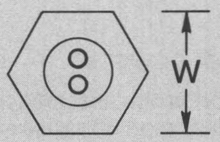


FIGURE 2 (FLAT, PLUG WELDED POINT)

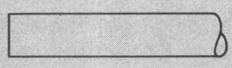


FIGURE 3 (TAPERED POINT)

		TUBING			THREADED HUB			ARMORED	EXTENSION LEADS						
ASSEMBLY PREFIX	FIG.	DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	SHEATH "C"	LENGTH "X"	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8401/A1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8401/A2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8401/A3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8401/B1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8401/B2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8401/B3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8402/A1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8402/A2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8402/A3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8402/B1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8402/B2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8402/B3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8400	1	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2	to		BRASS	3/4	1/8-27	7/16			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3	.250			7/8	1/4-18	9/16			28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
										26	NPC	KYNAR		125	
										24	OFHC	SIL. RUBBER		175	MC50
										22	Ni	FIBERGLASS		200	DC95
										20		KAPTON		260	
										18		POLYETHYLENE		300	P60
															P65
															P85
															P100
															SP's
															CTP's
															HTP's

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	18 20 22 24 26 28 30 32
CONSTRUCTION:	SOLID STRANDED
ALLOYS:	BARE COPPER TINNED COPPER SILVER PLATED COPPER NICKEL PLATED COPPER OFHC COPPER NICKEL DUMET
INSULATIONS:	TEFLON - TFE TEFLON - FEP POLYVINYL CHLORIDE - PVC SILICONE RUBBER POLYIMIDE FIBERGLASS POLYETHYLENE POLYALKENE FLUOROCARBON/POLYIMIDE KYNAR TEFZEL

SERIES T8500

STYLE: A series T8500 assembly consists of a rugged bead, a probe or a chip thermistor attached to insulated extension leads, and encapsulated into an open end tubing. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are made of stainless steel. Other materials are available upon special order. The thermistor may be partially exposed for fast response or may be completely encapsulated for protection.

APPLICATION: The series T8500 assemblies are extremely rugged sensor packages designed for use in applications where a leak-tight seal is required for low to moderate pressures. These assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids. The armored sheath provides maximum protection for the extension leads in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1

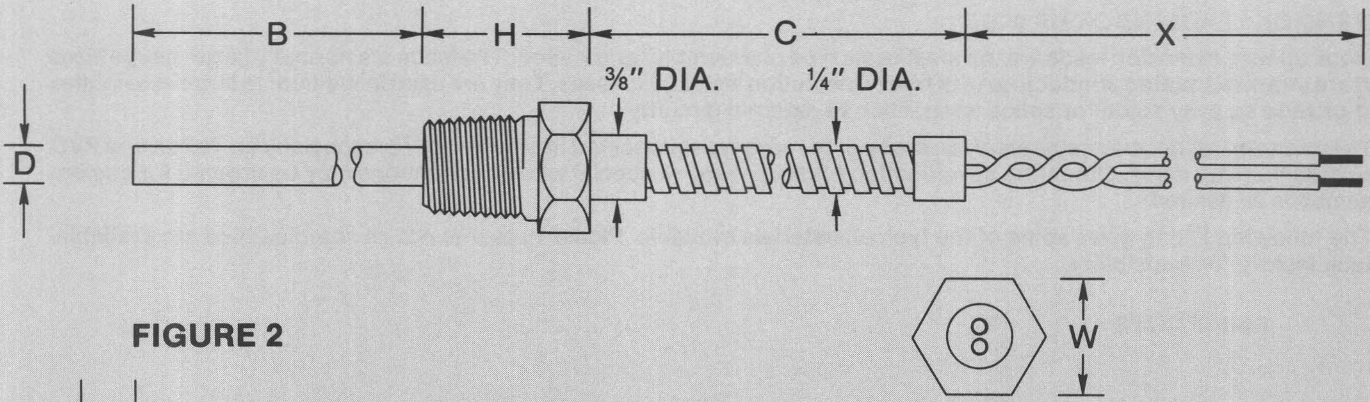
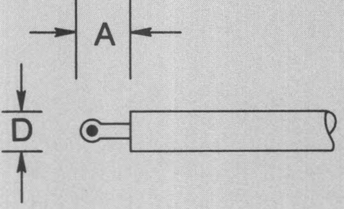


FIGURE 2



THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

ASSEMBLY PREFIX	FIG.	TIP DIM. "A"	TUBING			THREADED HUB			ARMORED SHEATH "C"	EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTORS
			DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"		LENGTH "X"	GA	ALLOY	INSULATION			
T8501/A1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8501/A2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8501/B1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8501/B2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8502/A1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8502/A2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8502/B1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8502/B2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8500	1	a/r	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS	3/4	1/8-27	7/16			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS			.250			7/8	1/4-18	9/16			28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
											26	NPC	KYNAR		125	
											24	OFHC	SIL. RUBBER		175	MC50
											22	Ni	FIBERGLASS		200	DC95
											20		KAPTON		260	
											18		POLYETHYLENE		300	P60
																P65
																P85
																P100
																SP's
																CTP's
																HTP's
																FP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

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OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

SERIES T8550

STYLE: A series T8550 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to insulated extension leads, and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension leads. The tubing, hub and armored sheath are made of stainless steel. Other materials are available upon special order. The thermistor is recessed at the tip to provide fast response as well as protection.

APPLICATION: The series T8550 assemblies are extremely rugged sensor packages designed for use in applications where fast response as well as mechanical protection are important and where a leak-tight seal is required for low to moderate pressures. The assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressure will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids. The armored sheath provides maximum protection for the extension leads in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1

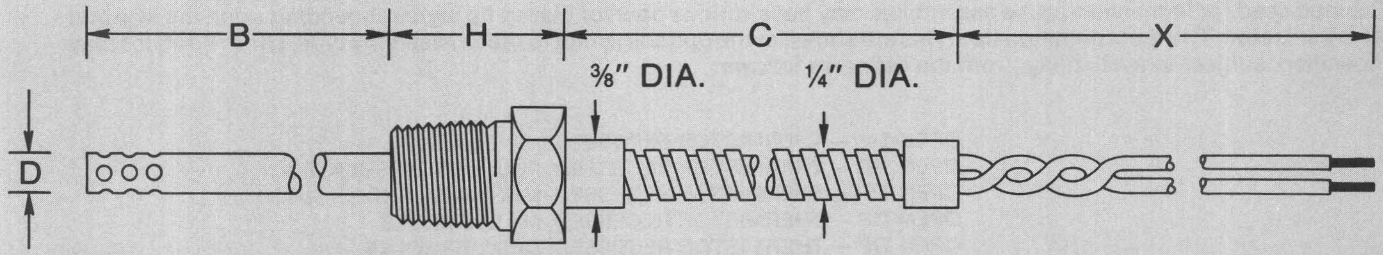


FIGURE 2

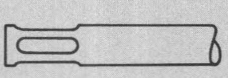
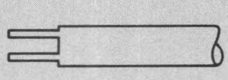


FIGURE 3



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			THREADED HUB			ARMORED	EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA. "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX W	SHEATH "C"	LENGTH "X"	GA	ALLOY	INSULATION			
T8551/A1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8551/B1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8551/C1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8551/D1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8551/E1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	TC	PVC	EPOXY	105	P60 PAIRS
T8551/F1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	22	SPC	TFE	EPOXY	200	P60 PAIRS
T8552/A1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8552/B1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8552/C1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8552/D1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8552/E1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	TC	PVC	EPOXY	105	P85 PAIRS
T8552/F1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	22	SPC	TFE	EPOXY	200	P85 PAIRS
T8550	1	a/r	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS	3/4	1/8-27	7/16			30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3		.250			7/8	1/4-18	9/16			28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
											26	NPC	KYNAR		125	
											24	OFHC	FIBERGLASS		175	MC50
											22	Ni	SIL. RUBBER		200	DC95
											20		KAPTON		260	
											18		POLYETHYLENE		300	P60
																P65
																P85
																P100
																SP's
																CTP's
																HTP's
																FP's

TUBING: STAINLESS STEEL

The most versatile and useful metal tubing in the Sensor Handbook is stainless steel. Tubing is available in hypodermic gauge sizes from #6 (.203"O.D.) to #25 (.020"O.D.) in alloy T304. Standard fractional tubing (ASTM A269) and close tolerance fractional tubing (ASTM A632) is available in alloys 304 or 316 as seamless or welded stock. Other series 300 or 400 alloys, special wall sizes and metric sizes can be specified for custom assemblies. The basic sizes most commonly used in the Sensor Handbook are listed in the following table.

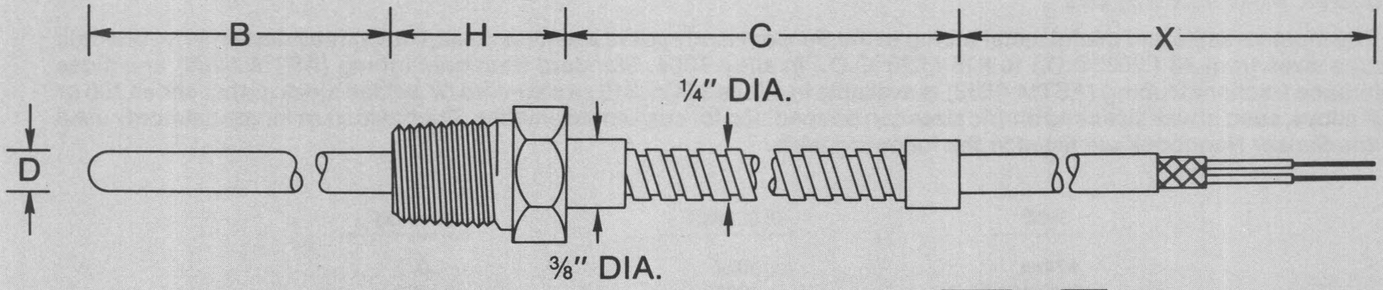
SIZE	O.D. (REF.)	I.D. (REF.)
#24xx	.022	.016
#22TW	.028	.020
1/32"	.0313	.0193
#21TW	.032	.022
#20TW	.0355	.0255
#19TW	.0425	.0325
#18TW	.050	.042
#17TW	.059	.046
1/16"	.0625	.0465
#16	.065	.047
#15	.072	.054
#14	.083	.063
3/32"	.0938	.0638
#13	.095	.071
#12TW	.109	.091
#11	.120	.094
1/8"	.125	.105
#10	.134	.106
#9	.148	.118
5/32"	.1563	.1243
#8	.165	.135
#7	.180	.150
3/16"	.1875	.1555
#6	.203	.173
7/32"	.2188	.1868
1/4"	.250	.210

SERIES T8600

STYLE: A series T8600 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor insulated and shielded cable, and encapsulated into a closed end tubing. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are made of stainless steel and the tubing closure is in one of three basic shapes. Other materials or closures are available upon special order.

APPLICATION: The series T8600 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement or control applications. The closed end tubing provides maximum protection for the thermistor and the tapered thread provides a leak-tight seal thus making these assemblies particularly well suited for applications in pressurized piping systems or vessels. Immersion in conductive or corrosive fluids, even at high pressures, presents no problems to these assemblies. The armored sheath provides maximum protection for the extension cable in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1 (SPHERICAL POINT)



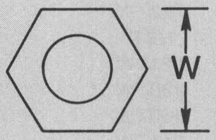


FIGURE 2 (FLAT, PLUG WELDED POINT)

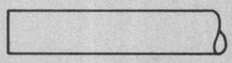


FIGURE 3 (TAPERED POINT)

THERMOMETRICS INC.

		TUBING			THREADED HUB			ARMORED	SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	SHEATH "C"	LENGTH "X"	# COND.	GA	ALLOY	INSUL./JKT	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8601/A1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/A2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/A3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/B1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8601/B2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8601/B3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8601/C1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/C2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/C3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8601/D1	1	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8601/D2	2	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8601/D3	3	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8602/A1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/A2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/A3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/B1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8602/B2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8602/B3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8602/C1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/C2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/C3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8602/D1	1	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8602/D2	2	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8602/D3	3	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8600	1	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2	to		BRASS	3/4	1/8-27	7/16			2	30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3	.250			7/8	1/4-18	9/16			3	28	SPC	TEFLON (FEP)		105	BR55
										4	26	NPC	POLYETHYLENE		175	
											24	SCCW	SIL. RUBBER		200	MC50
										RG	22	BCW	NEOPRENE		260	DC95
											20					P60
																P65
																P85
																P100
																SP's
																CTP's

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:

20
22
24
26
28
30
32

CONSTRUCTION:

RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:

BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

INSULATIONS:

TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

SERIES T8700

STYLE: A series T8700 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor insulated and shielded cable, and encapsulated into an open end tubing. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are made of stainless steel. Other materials are available upon special order. The thermistor may be partially exposed for fast response or may be completely encapsulated for protection.

APPLICATION: The series T8700 assemblies are extremely rugged sensor packages designed for use in applications where a leak-tight seal is required for low to moderate pressures. These assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids. The armored sheath provides maximum protection for the extension cable in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1

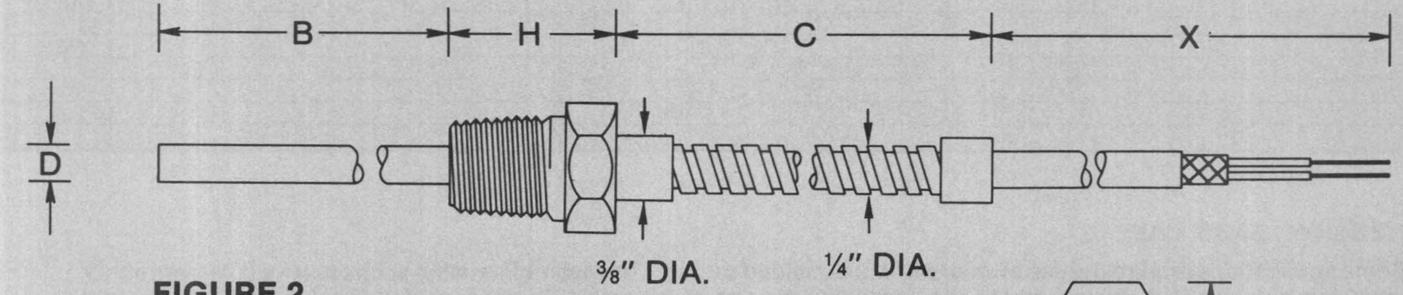
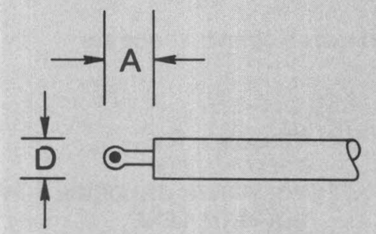
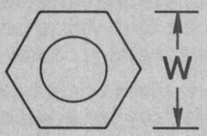


FIGURE 2





THERMOMETRICS INC.

		TIP	TUBING			THREADED HUB			ARMORED	SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	FIG.	DIM. "A"	DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"	SHEATH "C"	LENGTH "X"	# COND.	GA	ALLOY	INSUL./JKT	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
T8701/A1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8701/A2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8701/B1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8701/B2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8701/C1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8701/C2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8701/D1	1	—	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8701/D2	2	.100	.187	1-1/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8702/A1	1	—	.250	1/1-4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8702/A2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8702/B1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8702/B2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TEF/TFE	EPOXY	200	P85 PAIRS
T8702/C1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8702/C2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8702/D1	1	—	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8702/D2	2	.100	.250	1-1/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8700	1	a/r	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS	3/4	1/8-27	7/16			2	30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS			.250			7/8	1/4-18	9/16			3	28	SPC	TEFLON (FEP)		105	BR55
											4	26	NPC	POLYETHYLENE		175	
												24	SCCW	SIL. RUBBER		200	MC50
											RG	22	BCW	NEOPRENE		260	DC95
												20					
																	P60
																	P65
																	P85
																	P100
																	SP's
																	CTP's
																	FP's

TUBING TIP STYLES AND CLOSURES:

Tubings used for immersion probe assemblies may have various open or closed tip styles depending upon the size and material selected. The most common tip styles are shown in the options listing for each assembly type. Other tip styles may be specified, subject to availability, from the listing as follows:

OPEN TIP — THERMISTOR EXPOSED
OPEN TIP — THERMISTOR RECESSED, FULLY ENCAPSULATED
OPEN TIP — THERMISTOR RECESSED, MACHINED CROSS CUTS
OPEN TIP — THERMISTOR RECESSED, MILLED SLOTS
OPEN TIP — THERMISTOR RECESSED, DRILLED HOLES
OPEN TIP — THERMISTOR RECESSED, SHARPENED POINT
CLOSED TIP — SPHERICAL TIP, SELF WELDED
CLOSED TIP — SPHERICAL TIP, CONTROLLED WALL
CLOSED TIP — POINTED, TAPERED
CLOSED TIP — FLAT PLUG, WELDED OR BRAZED
CLOSED TIP — MACHINED INTERNAL DRILL POINT
CLOSED TIP — SHARPENED, BEVELED POINT

TERMINATIONS:

The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

SERIES T8750

STYLE: A series T8750 assembly consists of a ruggedized bead, a probe or a chip thermistor attached to a coaxial or multiconductor insulated and shielded cable, and encapsulated into an open end tubing with a slotted or drilled tip. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension cable. The tubing is welded or brazed to a tapered thread hub that accepts an armored sheath for protection of the extension cable. The tubing, hub and armored sheath are made of stainless steel. Other materials are available upon special order. The thermistor is recessed at the tip to provide fast response as well as protection.

APPLICATION: The series T8750 assemblies are extremely rugged sensor packages designed for use in applications where fast response as well as mechanical protection are important and where a leak-tight seal is required for low to moderate pressures. The assemblies are not suitable for use in systems where conductive or corrosive fluids are present or where high pressures will be encountered unless additional assembly or modifications are performed. Please consult the factory for specific information regarding materials selection when applications involve conductive or corrosive fluids. The armored sheath provides maximum protection for the extension cable in applications where heavy moving machinery or severe environments could cause damage.

FIGURE 1

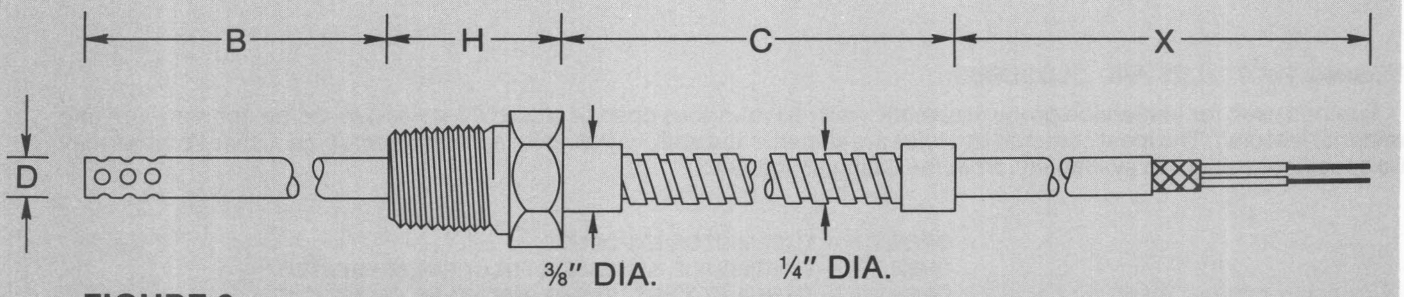


FIGURE 2

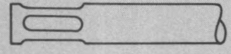
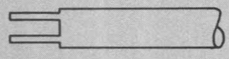


FIGURE 3



THERMOMETRICS INC.

ASSEMBLY PREFIX	FIG.	TIP OPENING DIM.	TUBING			THREADED HUB			ARMORED SHEATH "C"	SHIELDED / JACKETED CABLE					ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
			DIA "D"	LENGTH "B"	MT'L	LENGTH "H"	THREAD TYPE	HEX "W"		LENGTH "X"	# COND.	GA	ALLOY	INSUL./JKT			
T8751/A1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/B1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8751/C1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/D1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8751/E1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/F1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8751/G1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/H1	1	(12) x .078	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8751/J1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/K1	2	(4) .078 x .312	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8751/L1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P60 PAIRS
T8751/M1	3	(4) .078 x .234	.187	1-3/4	3/16 SS	3/4	1/8-27	7/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P60 PAIRS
T8752/A1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/B1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8752/C1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/D1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8752/E1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/F1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	2	24	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8752/G1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/H1	1	(12) x .109	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8752/J1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/K1	2	(4) .109 x .437	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8752/L1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	TC	PVC/PVC	EPOXY	105	P85 PAIRS
T8752/M1	3	(4) .109 x .327	.250	1-3/4	1/4 SS	7/8	1/4-18	9/16	48	12	4	28	SPC	TFE/TFE	EPOXY	200	P85 PAIRS
T8750	1	a/r	.095	a/r	SS304	23/32	1/16-27	5/16	a/r	a/r	1 + S	32	TC	PVC	EPOXY	60	BR32
SERIES	2		to		BRASS	3/4	1/8-27	7/16			2	30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	3		.250			7/8	1/4-18	9/16			3	28	SPC	TEFLON (FEP)		105	BR55
											4	26	NPC	POLYETHYLENE		175	
												24	SCCW	SIL. RUBBER		200	MC50
											RG	22	BCW	NEOPRENE		260	DC95
												20					
																	P60
																	P65
																	P85
																	P100
																	SP's
																	CTP's
																	FP's

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:

20
22
24
26
28
30
32

CONSTRUCTION:

RG CABLE
1 CONDUCTOR + SHIELD
2 CONDUCTORS W/ - OR - W/O SHIELD
3 CONDUCTORS W/ - OR - W/O SHIELD
4 CONDUCTORS W/ - OR - W/O SHIELD

ALLOYS:

BARE COPPER
COPPERWELD
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
SILVER CLAD COPPERWELD

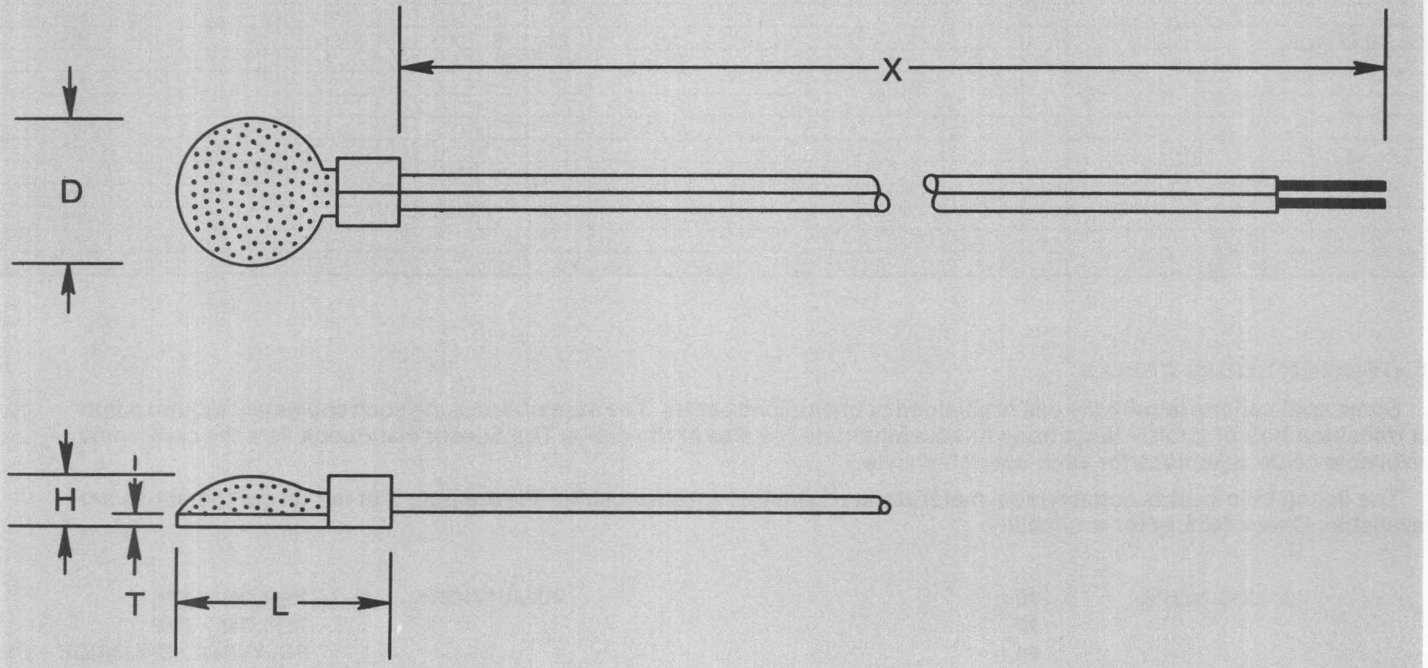
INSULATIONS:

TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
POLYETHYLENE
POLYPROPYLENE
NEOPRENE
SILICONE RUBBER
FIBERGLASS

SERIES M1000

STYLE: A series M1000 assembly consists of a bead thermistor, or bead pair, or a chip thermistor attached to insulated extension leads and epoxied onto a thin solid metal disc. The mount has small crimp tabs to strain relieve the extension leads and epoxy is built up over the thermistor and connections for additional protection and strain relief. The disc mount can be of stainless steel, aluminum, beryllium-copper, brass or other metals upon special order.

APPLICATION: The series M1000 assemblies are designed to be epoxied or taped to a flat surface for temperature measurement or control. These assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



	SURFACE SENSOR MOUNT					EXTENSION LEADS						
ASSEMBLY PREFIX	"T"	MATERIAL	"D"	"L"	"H"	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX TEMP.	RECOMMENDED THERMISTOR
M1001/A1	.005	SS304	.250	.500	.095	48	28	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1001/B1	.005	SS304	.250	.500	.095	48	28	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1001/C1	.005	SS304	.250	.500	.095	48	28	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1002/A1	.010	SS304	.250	.500	.095	48	28	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1002/B1	.010	SS304	.250	.500	.095	48	28	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1002/C1	.010	SS304	.250	.500	.095	48	28	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1003/A1	.005	ALUMINUM	.250	.375	.095	48	26	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1003/B1	.005	ALUMINUM	.250	.375	.095	48	26	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1003/C1	.005	ALUMINUM	.250	.375	.095	48	26	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1004/A1	.010	ALUMINUM	.250	.375	.095	48	26	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1004/B1	.010	ALUMINUM	.250	.375	.095	48	26	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1004/C1	.010	ALUMINUM	.250	.375	.095	48	26	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1005/A1	.016	ALUMINUM	.250	.375	.095	48	26	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1005/B1	.016	ALUMINUM	.250	.375	.095	48	26	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1005/C1	.016	ALUMINUM	.250	.375	.095	48	26	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
												BR11
M1000	.005	SS304	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR14
SERIES	to	ALUMINUM					30	SPC	TEFLON (TFE)	RTV	80	BR16
	.025	BeCu					28	NPC	TEFLON (FEP)	CERAMIC	105	BR23
		BRASS					26	Ni	KAPTON		125	BR32
							24	OFHC	KYNAR		175	BR42
							22	BC	POLYETHYLENE		200	BR55
									SIL. RUBBER		260	
									FIBERGLASS		300	B35
												B43
												MC50
												DC95

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

TERMINATIONS:

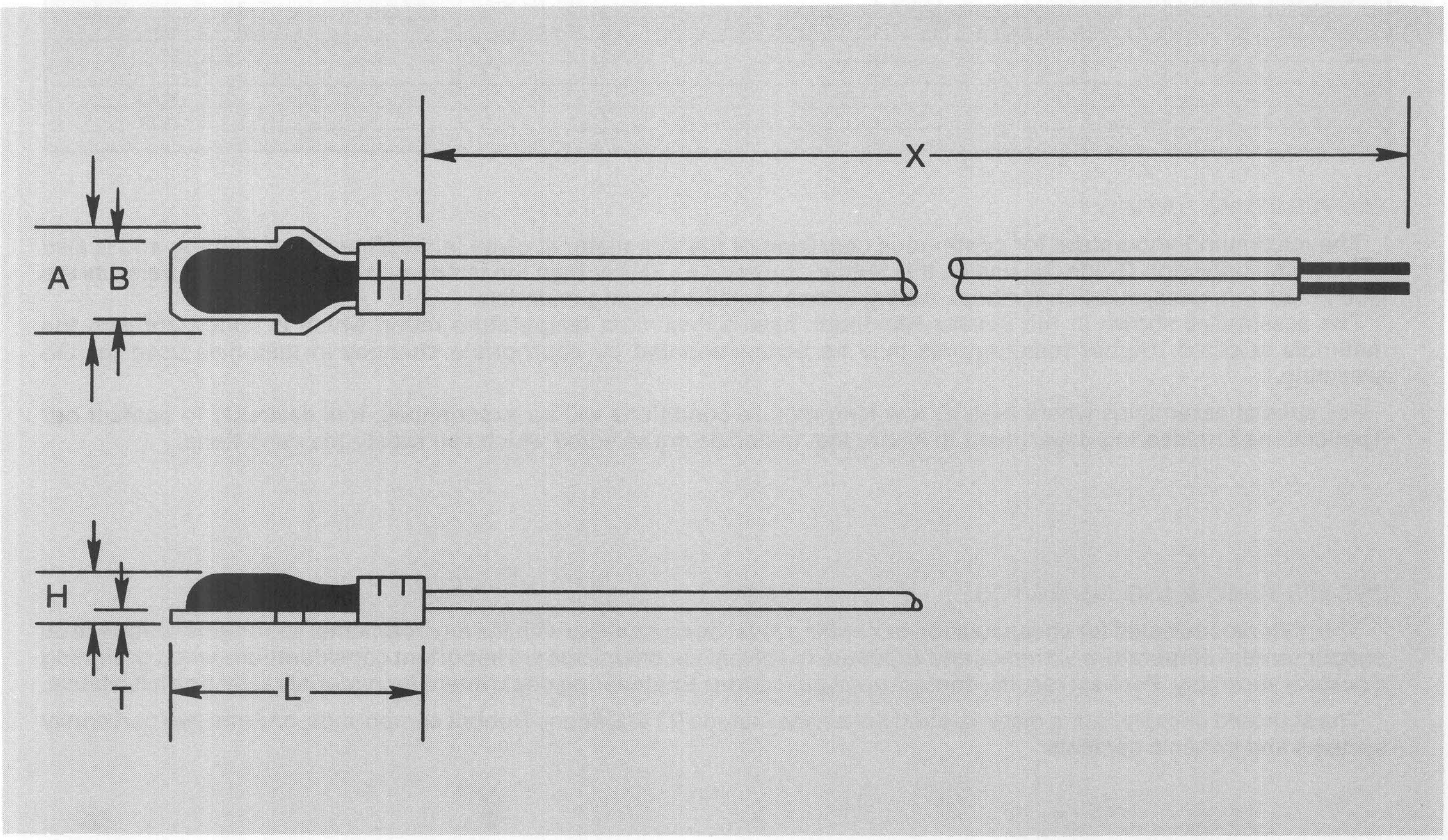
The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

SERIES M1100

STYLE: A series M1100 assembly consists of a bead thermistor, or bead pair, or a chip thermistor attached to insulated extension leads and epoxied onto a rectangular metal alloy tab. The mount has small crimp tabs to strain relieve the extension leads and epoxy is built up over the thermistor and connections for additional protection and strain relief. The mount can be electro-tin plated copper, nickel plated steel, nickel plated phosphor bronze or other metal alloys upon special order.

APPLICATION: The series M1100 assemblies are designed to be epoxied or taped to a flat surface for temperature measurement or control. The rectangular tab permits mounting in locations where a circular disc would be unsuitable. These assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



THERMOMETRICS INC.

ASSEMBLY PREFIX	SURFACE SENSOR MOUNT						EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	"T"	MATERIAL	"A"	"B"	"L"	"H"	LENGTH "X"	GA.	ALLOY	INSULATION			
M1101/A1	.032	ETP COPPER	.250	.187	.71	.156	48	28	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1101/B1	.032	ETP COPPER	.250	.187	.71	.156	48	28	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1101/C1	.032	ETP COPPER	.250	.187	.71	.156	48	28	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1102/A1	.032	ETP COPPER	.312	.250	.75	.156	48	28	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1102/B1	.032	ETP COPPER	.312	.250	.75	.156	48	28	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1102/C1	.032	ETP COPPER	.312	.250	.75	.156	48	28	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1103/A1	.032	NP STEEL	.250	.187	.62	.156	48	26	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1103/B1	.032	NP STEEL	.250	.187	.62	.156	48	26	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1103/C1	.032	NP STEEL	.250	.187	.62	.156	48	26	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1104/A1	.032	NP STEEL	.312	.250	.67	.156	48	26	TC	PVC	EPOXY	105	BR55 BR16 (2)
M1104/B1	.032	NP STEEL	.312	.250	.67	.156	48	26	SPC	TFE	EPOXY	200	BR55 BR16 (2)
M1104/C1	.032	NP STEEL	.312	.250	.67	.156	48	26	SPC	KAPTON	EPOXY	260	BR55 BR16 (2)
M1100	.016	ETP COPPER	a/r	.110	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	.020	NP STEEL		.187				30	SPC	TEFLON TFE	RTV	80	BR14
OPTIONS	.030	NP PH. BRZ.		.205				28	NPC	TEFLON FEP	CERAMIC	105	BR16
	.032			.250				26	OFHC	KAPTON		125	BR23
								24	Ni	KYNAR		175	BR32
								22		POLYETHYLENE		200	BR42
										SIL. RUBBER		260	BR55
										FIBERGLASS		300	
													B35
													B43
													MC50
													DC95

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

EXTENSION LEADS: FLAT TWIN LEAD, RIBBON CABLE

Flat twin lead or ribbon cables are larger gauge sizes than the magnet wires and are usually stranded conductors with heavier wall insulations. They are used on medium to large size assemblies. The options listing for such assemblies in the Sensor Handbook will give the commonly available flat twin lead or ribbon cable selections.

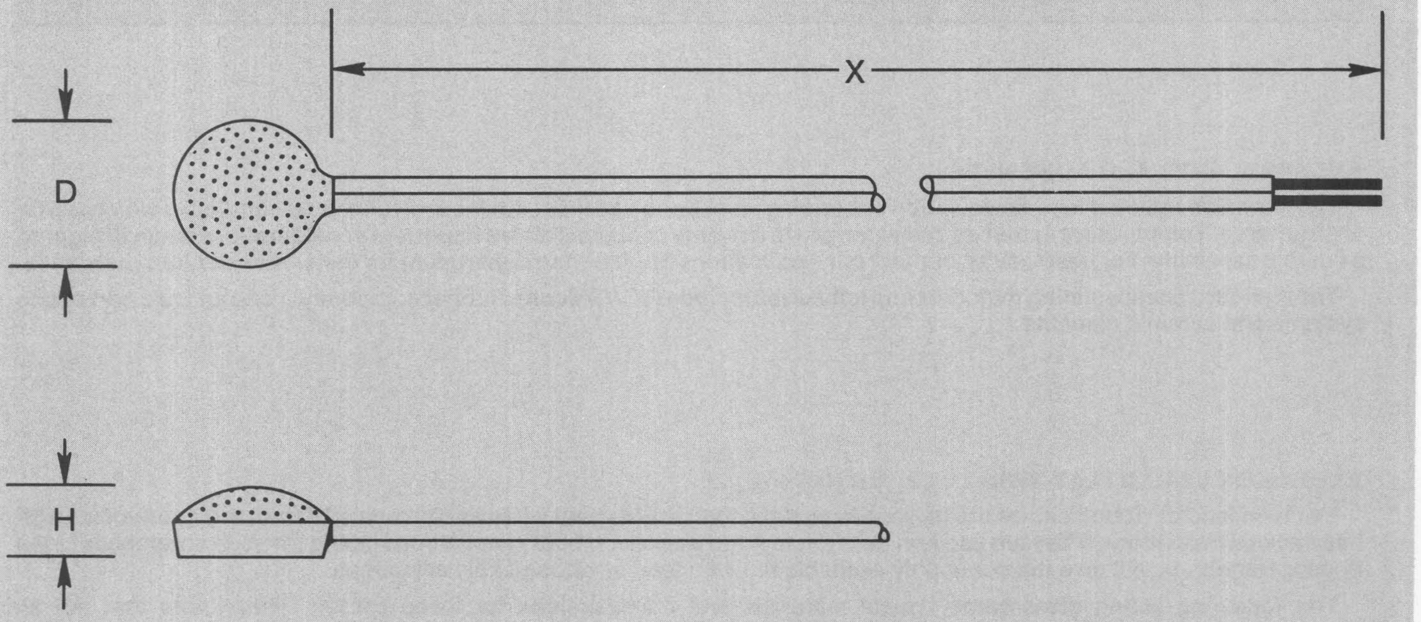
The following listing gives some typical materials and constructions for these cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	FLAT TWIN	#18 - #24
	RIBBON	#28 - #32
CONSTRUCTION:	SOLID	
	STRANDED	
ALLOYS:	BARE COPPER	
	TINNED COPPER	
	SILVER PLATED COPPER	
INSULATIONS:	TEFLON - TFE	
	PVC	

SERIES M1200

STYLE: A series M1200 assembly consists of a thermistor bead, or bead pair, or a chip thermistor attached to twin conductor cable and encapsulated into a sensor cup. The sensor cup is generally made of stainless steel, however, brass, aluminum or other materials may be specified. The encapsulant filled cup provides complete protection and strain relief for the thermistor and connections.

APPLICATION: The series M1200 assemblies are designed to be taped to a surface for temperature measurement. The convex shape of the encapsulant and the formed smooth edges of the cup make these assemblies well suited for skin temperature measurements. These assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



THERMOMETRICS INC.

	SURFACE SENSOR MOUNT			EXTENSION LEADS						
ASSEMBLY PREFIX	"D"	"H"	CUP MATERIAL	LENGTH "X"	GA.	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
M1201/A1	.375	.125	SS 304	48	30	TC	PVC	EPOXY	105	MC50 DC95
M1201/B1	.375	.125	SS 304	48	30	SPC	TFE	EPOXY	105	MC50 DC95
M1201/B2	.375	.125	SS 304	48	30	SPC	TFE	EPOXY	200	BR55
M1201/C1	.375	.125	SS 304	48	24	TC	PVC	EPOXY	105	MC50 DC95
M1201/D1	.375	.125	SS 304	48	22	TC	PVC	EPOXY	105	MC50 DC95
M1202/A1	.250	.125	SS 304	48	30	TC	PVC	EPOXY	105	BR32
M1202/B1	.250	.125	SS 304	48	30	SPC	TFE	EPOXY	200	BR32
M1203/A1	.187	.093	SS 304	48	30	TC	PVC	EPOXY	105	BR16
M1203/B1	.187	.093	SS 304	48	30	SPC	TFE	EPOXY	200	BR16
M1200	a/r	a/r	SS 304	a/r	22	TC	PVC	EPOXY	60	MC50
SERIES			BRASS		24	TC	PVC	RTV	80	DC95
OPTIONS			ALUMINUM						105	
			PLASTICS		30	TC	PVC		125	BR16
					30	SPC	TFE		175	BR23
					32	TC	PVC		200	BR32
					32	SPC	TFE		260	BR42
										BR55

EXTENSION LEADS: FLAT TWIN LEAD, RIBBON CABLE

Flat twin lead or ribbon cables are larger gauge sizes than the magnet wires and are usually stranded conductors with heavier wall insulations. They are used on medium to large size assemblies. The options listing for such assemblies in the Sensor Handbook will give the commonly available flat twin lead or ribbon cable selections.

The following listing gives some typical materials and constructions for these cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	FLAT TWIN	#18 - #24
	RIBBON	#28 - #32
CONSTRUCTION:	SOLID STRANDED	
ALLOYS:	BARE COPPER TINNED COPPER SILVER PLATED COPPER	
INSULATIONS:	TEFLON - TFE PVC	

TERMINATIONS:

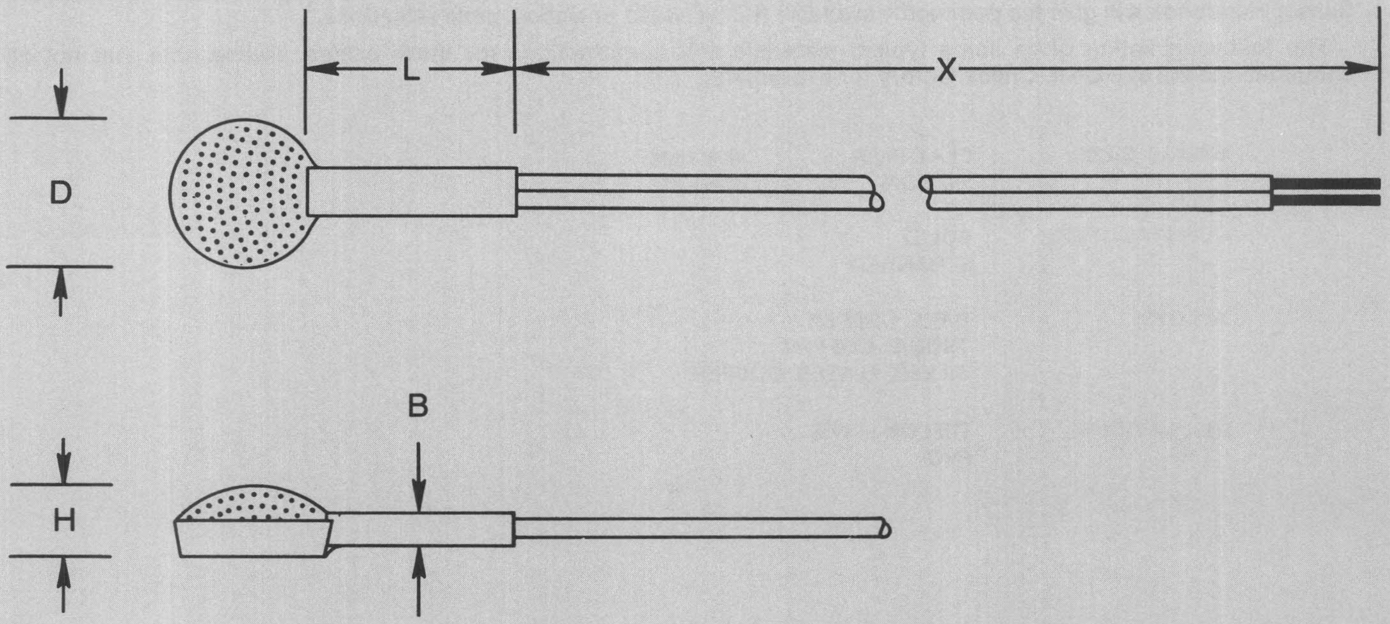
The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

SERIES M1300

STYLE: A series M1300 assembly consists of a thermistor bead, or bead pair, or a chip thermistor attached to insulated hook up wire and encapsulated into a sensor cup. The sensor cup is generally made of stainless steel and has a barrel for added strain relief on the extension leads. The barrel may also serve as an aid in mounting or handling of the sensor. Other materials may be specified for the sensor cup and barrel upon special order.

APPLICATION: The series M1300 assemblies may be used in a wide variety of surface temperature measurement applications. The sensor may be taped to the surface or may be held in position by means of a fixture or clamp on the barrel section. The assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



THERMOMETRICS INC.

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ASSEMBLY PREFIX	SURFACE SENSOR MOUNT					EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	"D"	"H"	CUP AND BARREL MATERIAL	"B"	"L"	LENGTH X	GA	ALLOY	INSULATION			
M1301/A1	.375	.156	SS304	.125	1/2	48	30	TC	PVC	EPOXY	105	MC50 BR55
M1301/B1	.375	.156	SS304	.125	1/2	48	30	SPC	TFE	EPOXY	200	BR55
M1302/A1	.375	.156	SS304	.125	1	48	28	TC	PVC	EPOXY	105	MC50 BR55
M1302/B1	.375	.156	SS304	.125	1	48	28	SPC	TFE	EPOXY	200	BR55
M1302/C1	.375	.156	SS304	.125	1	48	28	SPC	KAPTON	EPOXY	260	BR55
M1300	a/r	a/r	SS304	a/r	a/r	a/r	32	BC	PVC	EPOXY	60	MC50
SERIES			BRASS				30	TC	TEFLON (TFE)	RTV	80	DC95
OPTIONS			ALUMINUM				28	OFHC	TEFLON (FEP)	CERAMIC	105	
			PLASTICS				26	SPC	KYNAR		125	BR16
							24	NPC	KAPTON		175	BR23
							22	Ni	POLYETHYLENE		200	BR32
							20		SIL. RUBBER		260	BR42
									FIBERGLASS		300	BR55

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

HOUSING BODIES:

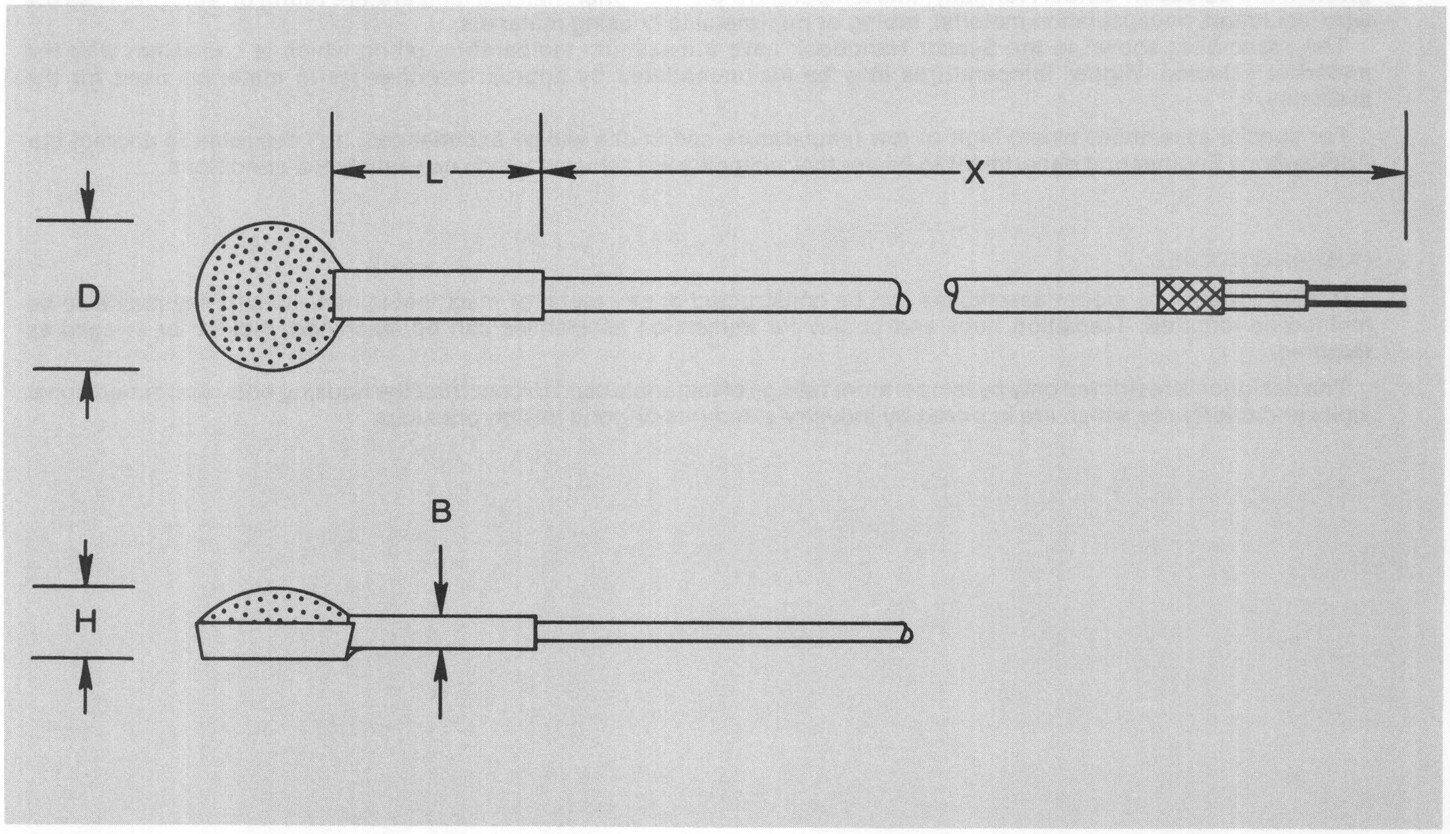
Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

SERIES M1400

STYLE: A series M1400 assembly consists of a thermistor bead, or bead pair, or a chip thermistor attached to a coaxial or multiconductor shielded cable and encapsulated into a sensor cup. The sensor cup is generally made of stainless steel and has a barrel for added strain relief on the extension cable. The barrel may also serve as an aid in mounting or handling the sensor. Other materials may be specified for the sensor cup and barrel upon special order.

APPLICATION: The series M1400 assemblies may be used in a wide variety of surface temperature measurements applications. They are well suited for applications where protection against interference signals is required. The sensors may be taped to the surface or may be held in position by means of a fixture or clamp on the barrel section. The assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



	SURFACE SENSOR MOUNT					SHIELDED / JACKETED CABLE							
ASSEMBLY PREFIX	"D"	"H"	CUP AND BARREL MATERIAL	"B"	"L"	LENGTH "X"	# COND.	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
M1401/A1	.375	.156	SS304	.125	1	48	1 + S	28	TC	PVC	EPOXY	105	MC50 BR55
M1401/B1	.375	.156	SS304	.125	1	48	1 + S	28	SPC	TFE	EPOXY	200	BR55
M1402/A1	.375	.187	SS304	.156	1-1/4	48	1 + S	24	TC	PVC	EPOXY	105	MC50 DC95
M1402/B1	.375	.187	SS304	.156	1-1/4	48	1 + S	24	SPC	TFE	EPOXY	200	BR55
M1403/A1	.375	.187	SS304	.156	1-1/4	48	2	30	TC	PVC	EPOXY	105	MC50 DC95
M1403/B1	.375	.187	SS304	.156	1-1/4	48	2	30	SPC	TFE	EPOXY	200	BR55
M1404/A1	.375	.187	SS304	.156	1-1/4	48	4	32	TC	PVC	EPOXY	105	MC50 DC95
M1404/B1	.375	.187	SS304	.156	1-1/4	48	4	30	SPC	TFE	EPOXY	200	BR55
M1400	a/r	a/r	SS304	a/r	a/r	a/r	1 + S	32	BC	PVC	RTV	60	MC50
SERIES			BRASS				2	30	TC	TEFLON (TFE)	EPOXY	80	DC95
OPTIONS			ALUMINUM				3	28	SPC	TEFLON (FEP)		105	
			PLASTICS				4	26	NPC	POLYETHYLENE		175	BR16
								24	SCCW	SIL. RUBBER		200	BR23
							RG	22	BCW	NEOPRENE		260	BR32
								20					BR42
													BR55

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

EXTENSION LEADS: CABLES

Some applications require the use of shielded or unshielded cables. The assemblies using such cables will require either a transition hub or a fairly large body to accommodate the size of the cable. The Sensor Handbook lists the commonly available cable selections for each assembly style.

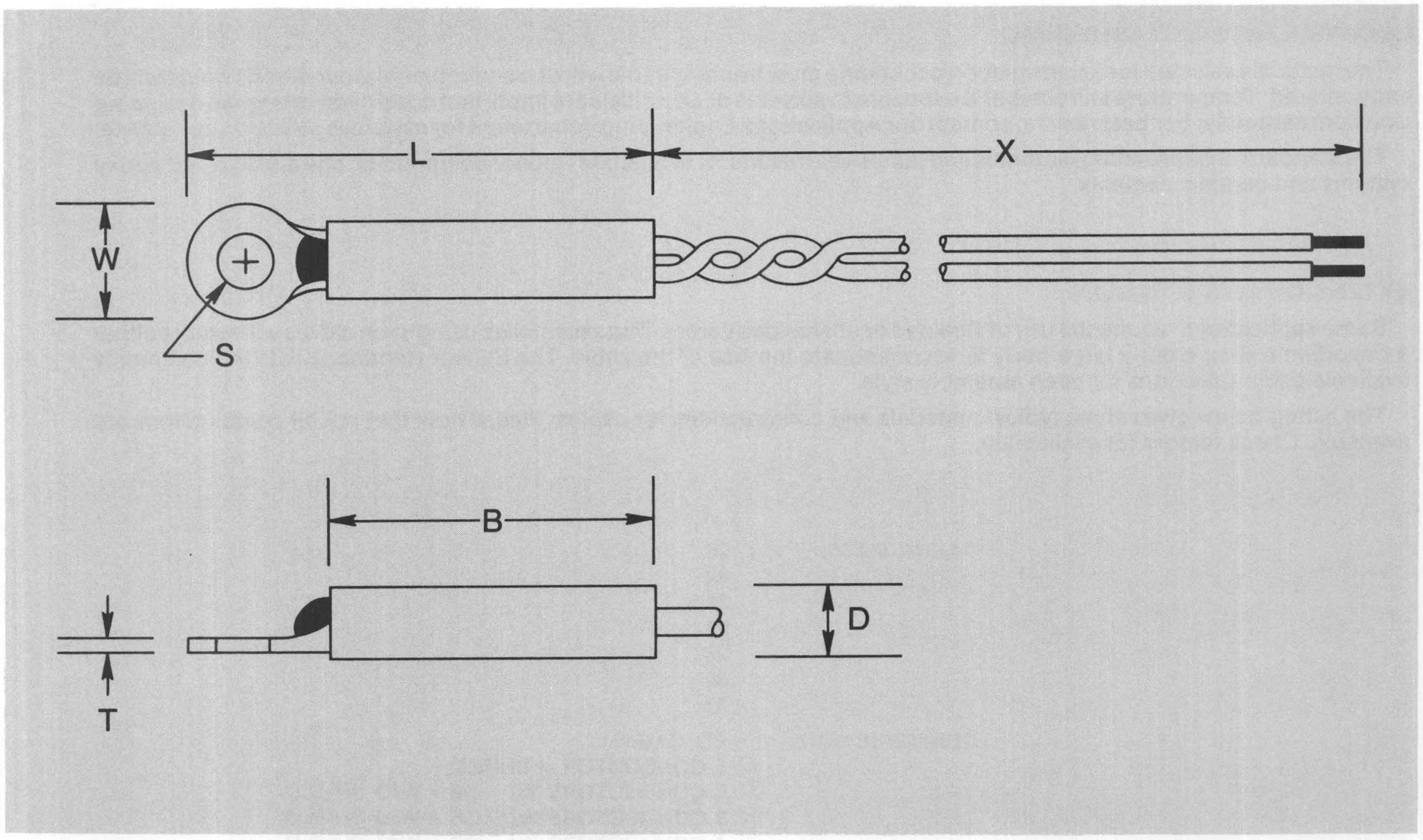
The listing below gives some typical materials and constructions for cables. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	20 22 24 26 28 30 32
CONSTRUCTION:	RG CABLE 1 CONDUCTOR + SHIELD 2 CONDUCTORS W/ - OR - W/O SHIELD 3 CONDUCTORS W/ - OR - W/O SHIELD 4 CONDUCTORS W/ - OR - W/O SHIELD
ALLOYS:	BARE COPPER COPPERWELD TINNED COPPER SILVER PLATED COPPER NICKEL PLATED COPPER SILVER CLAD COPPERWELD
INSULATIONS:	TEFLON - TFE TEFLON - FEP POLYVINYL CHLORIDE - PVC POLYETHYLENE POLYPROPYLENE NEOPRENE SILICONE RUBBER FIBERGLASS

SERIES M2000

STYLE: A series M2000 assembly consists of a bead, a probe or a chip thermistor attached to insulated hook up wires and encapsulated into a ring tongue solderless connector with a barrel. The solderless connector is available in electro-tin plated copper, nickel plated steel or nickel plated phosphor bronze material with various stud hole sizes. The barrel is available in stainless steel or brass and serves to strain relieve the extension lead connections.

APPLICATION: The series M2000 assemblies may be used in a wide variety of surface temperature measurement applications. The sensors are designed to be stud mounted with the thermistors recessed into the barrel section for protection. The assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



THERMOMETRICS INC.

	SURFACE MOUNT				TOTAL	BARREL			EXTENSION LEADS						
ASSEMBLY PREFIX	STUD "S"	MATERIAL	"T"	WIDTH "W"	LENGTH "L"	DIA "D"	LENGTH "B"	MATERIAL	LENGTH "X"	GA	ALLOY	INSUL.	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
M2001/A1	2	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	32	TC	PVC	EPOXY	105	P60, P65
M2001/B1	2	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	30	SPC	PVC	EPOXY	200	P60, P65
M2001/C1	2	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	28	SPC	KAPTON	EPOXY	260	P60, P65
M2002/A1	4	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	32	TC	PVC	EPOXY	105	P60, P65
M2002/B1	4	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	30	SPC	TFE	EPOXY	200	P60, P65
M2002/C1	4	ETP COPPER	.030	1/4	1-1/8	.156	3/4	SS304	48	28	SPC	KAPTON	EPOXY	260	P60, P65
M2003/A1	6	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	28	TC	PVC	EPOXY	105	P85
M2003/B1	6	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	26	SPC	TFE	EPOXY	200	P85
M2003/C1	6	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	24	SPC	KAPTON	EPOXY	260	P85
M2004/A1	8	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	28	TC	PVC	EPOXY	105	P85
M2004/B1	8	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	26	SPC	TFE	EPOXY	200	P85
M2004/C1	8	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	24	SPC	KAPTON	EPOXY	260	P85
M2005/A1	10	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	28	TC	PVC	EPOXY	105	P85
M2005/B1	10	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	26	SPC	TFE	EPOXY	200	P85
M2005/C1	10	ETP COPPER	.030	21/64	1-3/8	.187	7/8	SS304	48	24	SPC	KAPTON	EPOXY	260	P85
M2006/A1	1/4	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	TC	PVC	EPOXY	105	P100, DC95
M2006/B1	1/4	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	TFE	EPOXY	200	P100
M2006/C1	1/4	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	KAPTON	EPOXY	260	P100
M2007/A1	5/16	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	TC	PVC	EPOXY	105	P100, DC95
M2007/B1	5/16	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	TFE	EPOXY	200	P100
M2007/C1	5/16	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	KAPTON	EPOXY	260	P100
M2008/A1	3/8	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	TC	PVC	EPOXY	105	P100, DC95
M2008/B1	3/8	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	TFE	EPOXY	200	P100
M2008/C1	3/8	ETP COPPER	.040	39/64	1-3/4	.250	1"	SS304	48	22	SPC	KAPTON	EPOXY	260	P100
M2000	2	ETP COPPER	.020	1/4	a/r	.156	a/r	SS304	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES	4	NP STEEL	to	to		to		BRASS		30	SPC	TEFLON (FEP)	RTV	80	BR14
OPTIONS	6	NP Ph. BRZ.	.040	3/4		.250				28	NPC	TEFLON (TFE)	CERAMIC	105	BR16
	8									26	OFHC	KAPTON		125	BR23
	10									24	Ni	KYNAR		175	BR32
	1/4									22	BC	FIBERGLASS		200	BR42
	5/16											POLYETHYL		260	BR55
	3/8											SIL. RUBBER		300	
	7/16														MC50
	1/2														DC95
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															SP's
															CTP;s

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

ENCAPSULANTS AND ADHESIVES:

The materials selected for encapsulation or bonding must be compatible with the environmental conditions which will be encountered. Temperature extremes and exposure to solvents or chemicals are important considerations when designing a custom assembly. For best results, contact our Applications Engineering department for materials selection assistance.

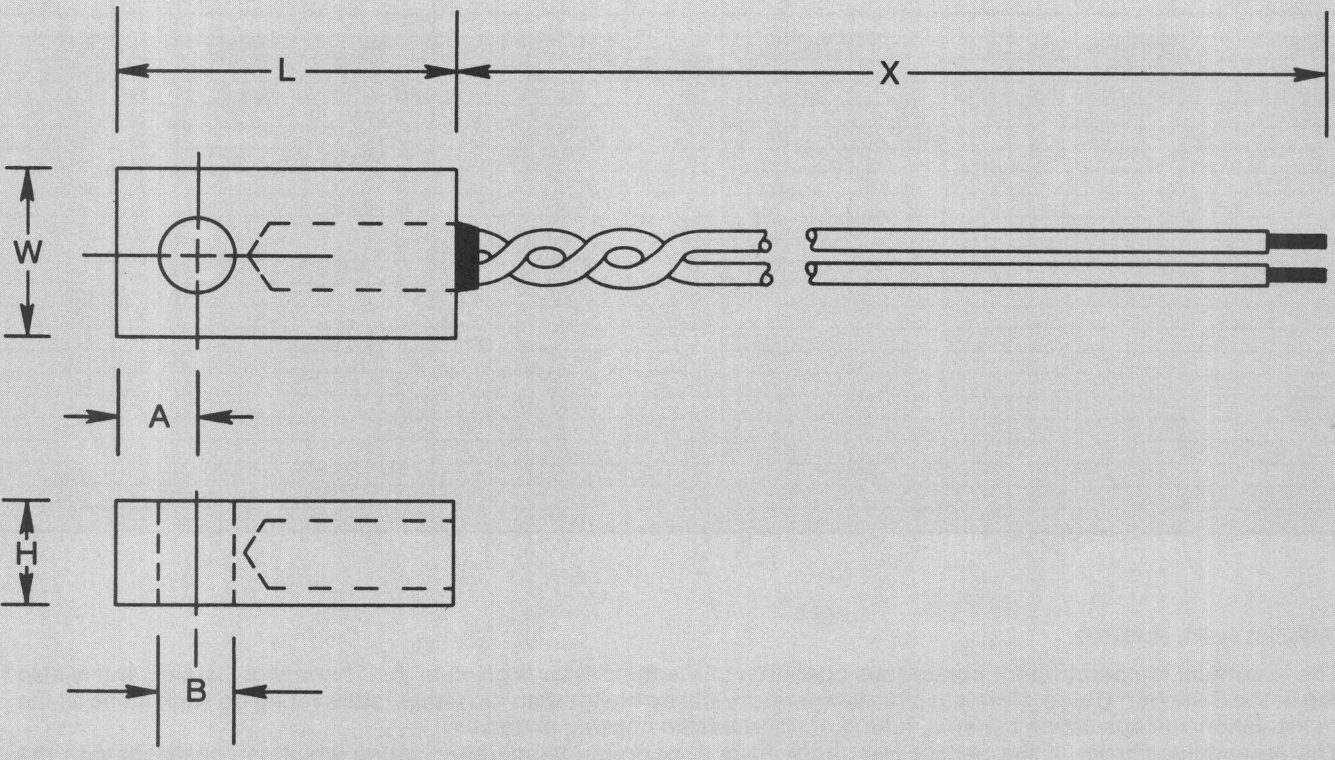
The standard encapsulating materials and adhesives include RTV/Silicone Rubber compounds, one and two part epoxy systems and ceramic cements.

SERIES M3000

STYLE: A series M3000 assembly consists of a bead, a probe or a chip thermistor attached to insulated hook up wire and encapsulated into a machined, rectangular block. The block has a blind hole drilled to accept the thermistor and extension leads and one or more drilled holes for mounting. Various metals or plastics are available for the body material and all dimensions may be specified as desired.

APPLICATION: The series M3000 assemblies are ruggedized sensor packages which can be bolted to a wide variety of surfaces or shapes, depending upon the basic dimensions and hole patterns selected. The assemblies are suitable for many surface temperature measurement applications. They are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.

FIGURE 1



THERMOMETRICS INC.

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

ASSEMBLY PREFIX	SURFACE SENSOR MOUNT				MOUNTING PATTERN			WELL		EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	LENGTH L	WIDTH W	HEIGHT H	MATERIAL	FIG.	BOLT "B"	DIMENSIONS	DIA. D	DEPTH P	LENGTH X	GA	ALLOY	INSUL.			
M3001/A1	3/4	9/32	3/16	ALUM.	1	.160	A=.125	.125	.42	48	26	TC	PVC	EPOXY	105	BR55 MC50
M3001/B1	3/4	9/32	3/16	ALUM.	1	.160	A=.125	.125	.42	48	26	SPC	TFE	EPOXY	200	BR55
M3001/C1	3/4	9/32	3/16	ALUM.	1	.160	A=.125	.125	.42	48	26	SPC	KAPTON	EPOXY	260	BR55
M3002/A1	3/4	3/8	1/4	ALUM.	1	.160	A=.156	.187	.42	48	22	TC	PVC	EPOXY	105	BR55 DC95
M3002/B1	3/4	3/8	1/4	ALUM.	1	.160	A=.156	.187	.42	48	22	SPC	TFE	EPOXY	200	BR55
M3002/C1	3/4	3/8	1/4	ALUM.	1	.160	A=.156	.187	.42	48	22	SPC	KAPTON	EPOXY	260	BR55
M3003/A1	3/4	1/2	1/4	ALUM. & AU	1	.125	A=.250	.187	.42	48	22	TC	PVC	EPOXY	105	BR55 DC95
M3003/B1	3/4	1/2	1/4	ALUM. & AU	1	.125	A=.250	.187	.42	48	22	SPC	TFE	EPOXY	200	BR55
M3003/C1	3/4	1/2	1/4	ALUM. & AU	1	.125	A=.250	.187	.42	48	22	SPC	KAPTON	EPOXY	260	BR55
M3004/A1	3/4	1/2	1/4	ALUM. & AU	2	.125	A=.250 T=.250	.187	.42	48	22	TC	PVC	EPOXY	105	BR55 DC95
M3004/B1	3/4	1/2	1/4	ALUM. & AU	2	.125	A=.250 T=.250	.187	.42	48	22	SPC	TFE	EPOXY	200	BR55
M3004/C1	3/4	1/2	1/4	ALUM. & AU	2	.125	A=.250 T=.250	.187	.42	48	22	SPC	KAPTON	EPOXY	260	BR55
M3005/A1	3/4	3/8	3/16	ALUM. & AU	3	.125	A=.375	.125	.31	48	26	TC	PVC	EPOXY	105	BR55 MC50
M3005/B1	3/4	3/8	3/16	ALUM. & AU	3	.125	A=.375	.125	.31	48	26	SPC	TFE	EPOXY	200	BR55
M3005/C1	3/4	3/8	3/16	ALUM. & AU	3	.125	A=.375	.125	.31	48	26	SPC	KAPTON	EPOXY	260	BR55
M3006/A1	1	3/4	3/16	ALUM. & AU	4	.125	A=.750 C=.500	.125	.63	48	26	TC	PVC	EPOXY	105	P60B MC50
M3006/B1	1	3/4	3/16	ALUM. & AU	4	.125	A=.750 C=.500	.125	.63	48	26	SPC	TFE	EPOXY	200	P60B
M3006/C1	1	3/4	3/16	ALUM. & AU	4	.125	A=.750 C=.500	.125	.63	48	26	SPC	KAPTON	EPOXY	260	P60B
M3000	a/r	a/r	a/r	ALUMINUM	1	a/r	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR11
SERIES				ALUM. & AU	2						30	BC	TEFLON (TFE)	RTV	80	BR14
OPTIONS				BRASS	3						28	OFHC	TEFLON (FEP)	CERAMIC	105	BR16
				COPPER	4						26	SPC	POLYETHYLENE		125	BR23
				SS304							24	NPC	KAPTON		175	BR32
				SS316							22	Ni	KYNAR		200	BR42
											20		FIBERGLASS		260	BR55
				PHENOLICS							18		SIL. RUBBER		300	
				EPOXIES												MC50
				PLASTICS												DC95
																P20
																P25
																P30
																P60
																P65
																P85
																P100
																CTP's
																SP's

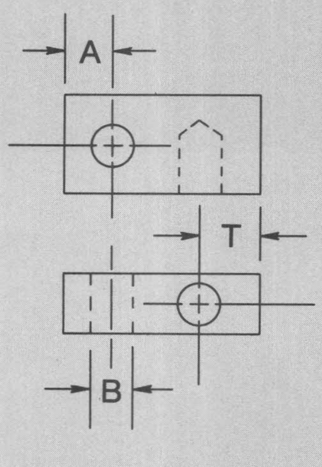


FIGURE 2

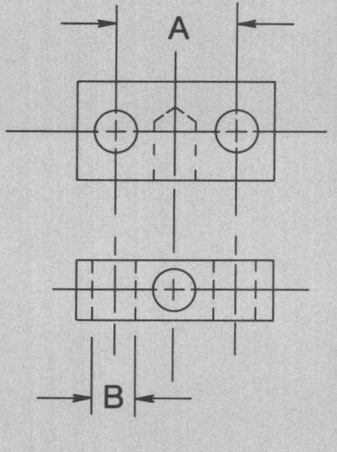


FIGURE 3

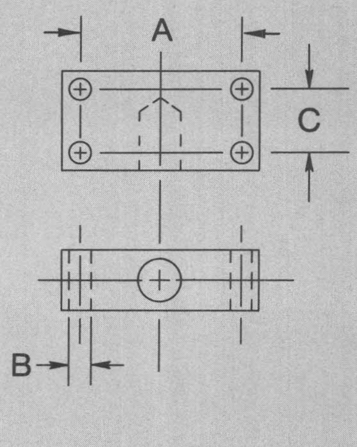
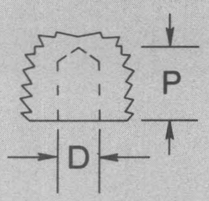


FIGURE 4

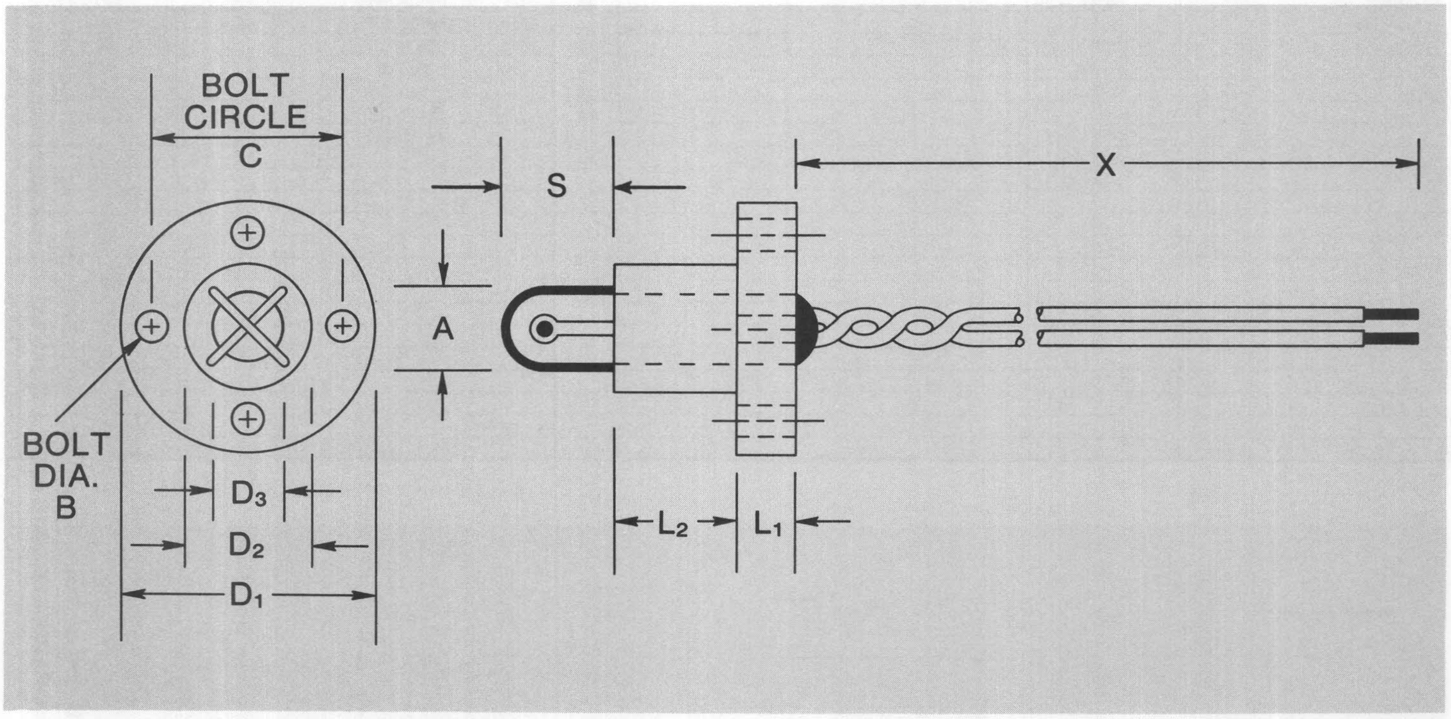


THERMISTOR
WELL
DETAIL

SERIES M3400

STYLE: A series M3400 assembly consists of a probe thermistor attached to insulated hook up wires and encapsulated into a cylindrically shaped housing with a flange for bolt mounting. The probe is exposed in the open end cylindrical housing with a protective wire cage or shield over the probe tip. The housing can be machined from various metals or plastics and basic diameters or dimensions may be specified as desired.

APPLICATIONS: The series M3400 assemblies are designed for bolt mounting to a surface, such as a duct wall, so that the thermistor probe is exposed to gas or fluid flow. The wire cage or shield provides some protection to the exposed probe tip. The assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.



THERMOMETRICS INC.

	SURFACE SENSOR BODY					BOLT MOUNT			WIRE SHIELD			WELL	EXTENSION LEADS						
ASSEMBLY PREFIX	MATERIAL	DIA. D_1	LENGTH L_1	DIA. D_2	LENGTH L_2	#	DIA. B	CIRCLE C	WIRE DIA.	WIDTH A	HEIGHT S	DIA. D_3	LENGTH X	GA	ALLOY	INSULATION	ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
M3401/A1	ALUMINUM	1	5/32	3/8	15/32	2	.14	11/16	.031	11/32	3/8	1/4	48	22	TC	PVC	EPOXY	105	P100 PAIRS
M3401/B1	ALUMINUM	1	5/32	3/8	15/32	2	.14	11/16	.031	11/32	3/8	1/4	48	22	SPC	TFE	EPOXY	200	P100 PAIRS
M3401/C1	ALUMINUM	1	5/32	3/8	15/32	2	.14	11/16	.031	11/32	3/8	1/4	48	22	NPC	TFE	EPOXY	260	P100 PAIRS
M3402/A1	ALUMINUM	1	5/32	3/8	15/32	4	.125	11/16	.031	11/32	3/8	1/4	48	22	TC	PVC	EPOXY	105	P100 PAIRS
M3402/B1	ALUMINUM	1	5/32	3/8	15/32	4	.125	11/16	.031	11/32	3/8	1/4	48	22	SPC	TFE	EPOXY	200	P100 PAIRS
M3402/C1	ALUMINUM	1	5/32	3/8	15/32	4	125	11/16	.031	11/32	3/8	1/4	48	22	NPC	TFE	EPOXY	260	P100 PAIRS
M3400	ALUMINUM	a/r	a/r	a/r	a/r	a/r	a/r	a/r	a/r	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	P20
SERIES	BRASS													30	BC	TEFLON (TFE)	RTV	80	P25
OPTIONS	COPPER													28	OFHC	TEFLON (FEP)	CERAMIC	105	P30
	SS304													26	SPC	KYNAR		125	P60
	SS316													24	NPC	KAPTON		175	P65
														22	Ni	FIBERGLASS		200	P85
	PHENOLICS													20		POLYETHYLENE		260	P100
	EPOXIES													18		SIL. RUBBER		300	
	PLASTICS																		

HOUSING BODIES:

Bodies for surface mount assemblies can be constructed of any metal or machinable non-metal. They may also be molded as required. Transition hubs and bodies for immersion assemblies can be machined, molded or swaged as required.

The designer is restricted only by temperature ratings of materials used to construct the housing body and dimensional limits and tolerances which are imposed by industry standards or good design practices.

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:
18
20
22
24
26
28
30
32

CONSTRUCTION:
SOLID
STRANDED

ALLOYS:
BARE COPPER
TINNED COPPER
SILVER PLATED COPPER
NICKEL PLATED COPPER
OFHC COPPER
NICKEL
DUMET

INSULATIONS:
TEFLON - TFE
TEFLON - FEP
POLYVINYL CHLORIDE - PVC
SILICONE RUBBER
POLYIMIDE
FIBERGLASS
POLYETHYLENE
POLYALKENE
FLUOROCARBON/POLYIMIDE
KYNAR
TEFZEL

SERIES M4000

STYLE: A series M4000 assembly consists of a ruggedized bead or chip thermistor attached to insulated hook up wires and cemented to the back of a thin contact shoe. The contact shoe is mounted onto flexible circuit board material which can be of various NEMA grades of epoxy or phenolic resins with paper or glass cloth reinforcement. The board can be cut into various sizes and shapes as required. An aluminum bracket with a self locking nut is riveted to the board for mounting purposes.

APPLICATION: The series M4000 assemblies are suitable for surface temperature measurements of moving parts such as rollers or cams. The mounting bracket allows the assembly to be positioned such that the contact shoe is held against the surface with a slight amount of pressure. The flexible circuit board allows for minor motion such as would be encountered by slow rotating cams or surface irregularities. The assemblies are not generally suitable for high speed rotational equipment. The assemblies are not fully immersible and should not be used in applications where conductive or corrosive fluids are present unless additional assembly or modifications are performed.

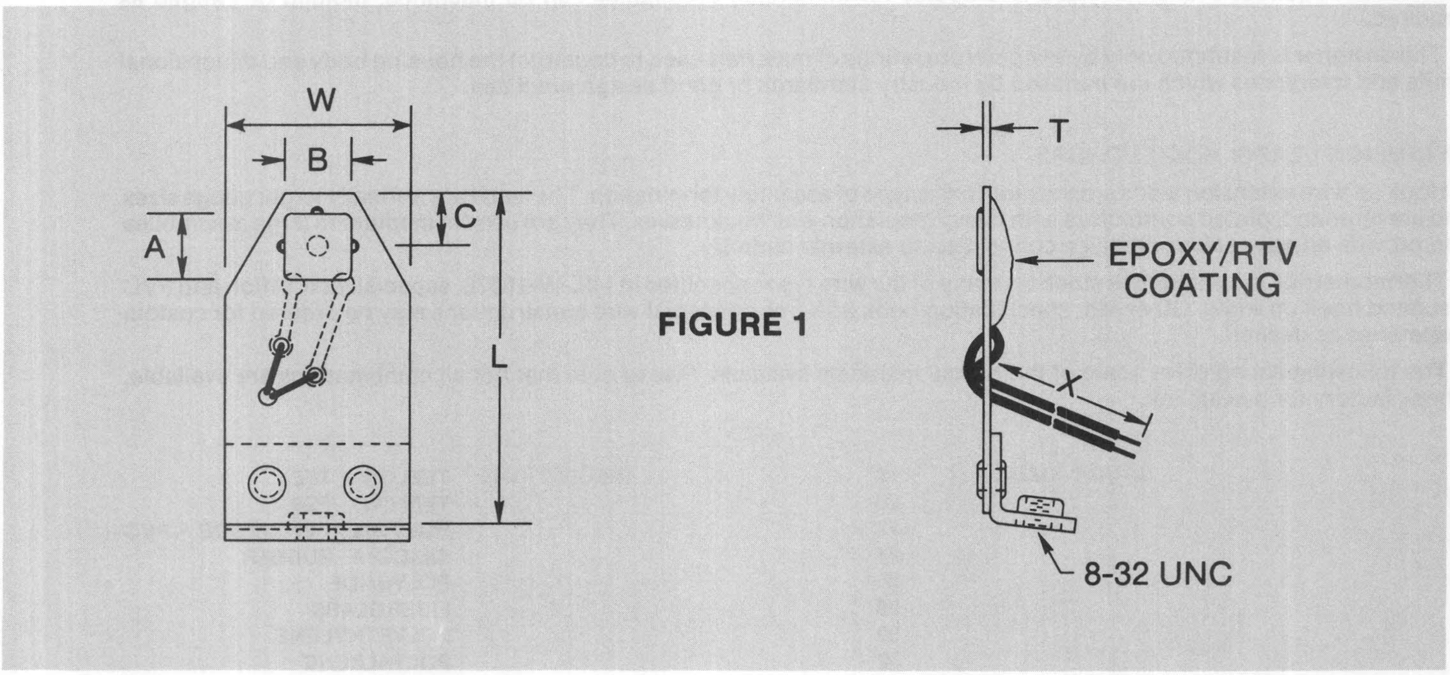


FIGURE 1

		FLEXIBLE SURFACE MOUNT WITH RIVETED BRACKET								EXTENSION LEADS						
ASSEMBLY PREFIX	**FIG.**	**BOARD MATERIAL**	**L**	**W**	**T**	**CONTACT MATERIAL**	**A**	**B**	**C**	**LENGTH X**	**GA**	**ALLOY**	**INSULATION**	**COATING**	**MAX. TEMP.**	**RECOMMENDED THERMISTOR**
M4001/A1	1	NEMA FR-5	1.8	1.0	.015	.007 BeCu	.375	.375	.300	48	22	TC	PVC	EPOXY	105	BR55
M4001/B1	1	NEMA FR-5	1.8	1.0	.015	.007 BeCu	.375	.375	.300	48	22	SPC	TFE	EPOXY	180	BR55
M4002/A1	2	NEMA FR-5	1.6	1.5	.015	.007 BeCu	.375	.750	.438	48	22	TC	PVC	EPOXY	105	BR55
M4002/B1	2	NEMA FR-5	1.6	1.5	.015	.007 BeCu	.375	.750	.438	48	22	SPC	TFE	EPOXY	180	BR55
M4003/A1	3	NEMA FR-5	2.0	1.5	.015	.007 BeCu	.375	.750	.438	48	22	TC	PVC	EPOXY	105	BR55
M4003/B1	3	NEMA FR-5	2.0	1.5	.015	.007 BeCu	.375	.750	.438	48	22	SPC	TFE	EPOXY	180	BR55
M4000	1	ALL NEMA	a/r	a/r	a/r	BeCu	a/r	a/r	a/r	a/r	32	BC	PVC	EPOXY	60	BR16 (2)
SERIES	2	GRADES				SS304					30	TC	TEFLON (TFE)	RTV	80	BR23 (2)
OPTIONS	3					BRASS					28	OFHC	TEFLON (FEP)		105	BR32 (2)
						ALUMINUM					26	SPC	KAPTON		125	BR42 (2)
						+					24	NPC	KYNAR		175	BR55 (2)
						OTHERS					22	Ni	POLYETHYLENE		180	
													SIL. RUBBER		200	MC50
													FIBERGLASS			DC95

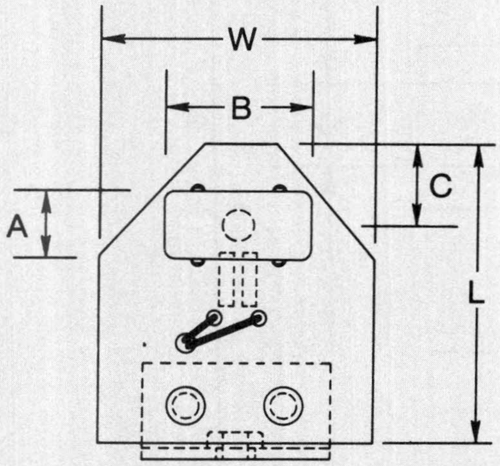


FIGURE 2

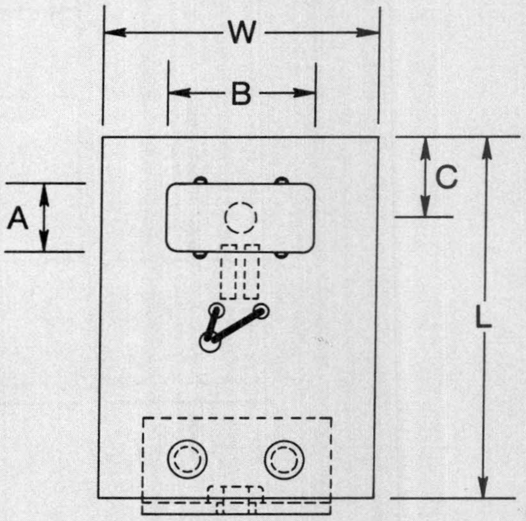
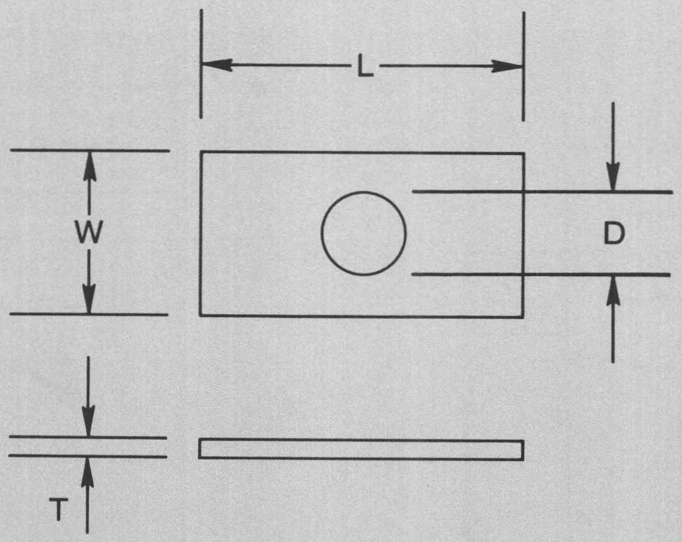


FIGURE 3

SERIES M4500

STYLE: A series M4500 assembly consists of a bead thermistor, (or several beads) which is mounted on a rigid, copper clad laminated circuit board. The thermistor is positioned above an opening in the circuit board. Basic size and shape, the number, location and dimensions of the openings may be specified as desired. Special features, such as edge connectors, terminal pads or posts may also be specified as desired.

APPLICATION: The series M4500 assemblies provide an effective mount for thermistor beads in a wide variety of applications. They are well suited for air temperature or air flow sensing applications. The rigid circuit board is easily handled and permits the thermistor to be connected to other circuitry with minimum difficulty. The bead, or beads, will sense the ambient air conditions through the opening in the circuit board.



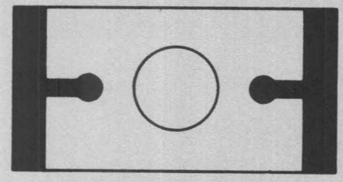


FIGURE 1

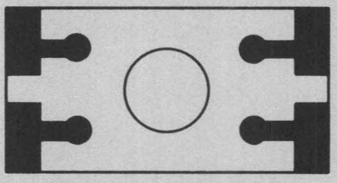


FIGURE 2

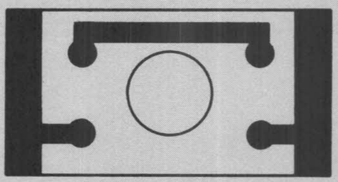


FIGURE 3

ASSEMBLY PREFIX	FIG.	LAMINATE					CIRCUIT	MAX. TEMP.	RECOMMENDED THERMISTOR
		MATERIAL AND GRADE	THICK "T"	LENGTH "L"	WIDTH "W"	DIA. "D"			
M4501	1	2 OZ. T.C. (1 SIDE), NEMA FR-5	.031	1	.500	.250	2 OPPOSING PADS	180	1 BEAD (P)
M4502	2	2 OZ. T.C. (1 SIDE), NEMA FR-5	.031	1	.500	.250	4 OPPOSING PADS	180	2 BEADS (J,K,P)
M4503	3	2 OZ. T.C. (1 SIDE), NEMA FR-5	.031	1	.500	.250	2 OPPOSING + 2 COMMON PADS	180	2 BEADS (J,K)
M4500		ALL NEMA GRADES*	.031	a/r	a/r	a/r	AS REQUIRED		B05 B07
SERIES			.063						B10 B14
OPTIONS			.094						B35
			.125						B43
									BR11
									BR14
									BR16
									BR23
									BR32
									BR42
									BR55

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

COATINGS:

Various coatings can be provided for additional protection against the effects of moisture, solvents or chemicals. Lacquers, varnishes, liquid epoxy resins, polyurethanes, vinyls and silicones are commonly used for dip coatings or sprayed finishes on various special assemblies.

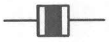
SERIES M5000

STYLE: A series M5000 assembly consists of thermistor infrared flakes soldered to the pins of a standard JEDEC "TO" style transistor base. The flakes are available in sizes from .020" x .020" to .120" x .120" and in thicknesses of .001" or .002". The flakes may be mounted as single units, pairs or multiple units in a variety of circuits. The most common transistor bases and pin layout patterns are shown. Other bases and pin layout patterns, as well as base materials, may be available upon special order. A protective nickel cap can be epoxied to the base, welded to the base or left as removable depending on the application. Optical filters can be epoxied over a hole in the cap as required for special applications.

APPLICATION: The series M5000 assemblies are extremely well suited for non-contact temperature measurement applications. They may also be used in flow measurement, gas analysis and general measurement and control applications. For intruder alarm applications a coated Germanium filter with a 7 to 13 micron bandpass is epoxied onto the nickel cap. Other filters or windows may be available upon special request. For optimum stability these assemblies should not be stored or operated at temperatures in excess of 105 C.

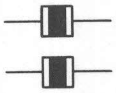
CIRCUIT SCHEMATICS

OPPOSITE LEADS



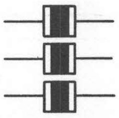
1P

OPPOSITE LEADS SIDE BY SIDE



2P

OPPOSITE LEADS SIDE BY SIDE



3P

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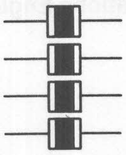
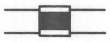


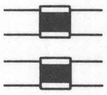
4P

DOUBLE ADJACENT LEADS



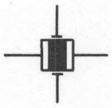
1D

DOUBLE ADJACENT LEADS SIDE BY SIDE



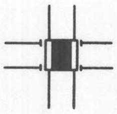
2D

OPPOSITE LEADS VERTICAL MOUNT



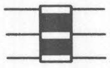
PX

DOUBLE ADJACENT LEADS VERTICAL MOUNT



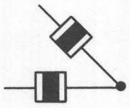
DX

TRIPLE ADJACENT LEADS



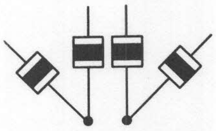
1T

OPPOSITE LEADS ONE DIVIDER CIRCUIT



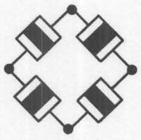
2V

OPPOSITE LEADS TWO DIVIDER CIRCUITS



4V

OPPOSITE LEADS FULL BRIDGE



4B

ASSEMBLY PREFIX	FIG	HEADER			NICKEL CAP				FILTER				PIN LAYOUT			FLAKE THERMISTOR
		H	L	BASE MATERIAL	B	C	D	TYPE SEAL	W1	W2	F	FILTER MATERIAL	#	CIRCUIT CONNECTION	CKT	
M5001/A1	1	.250	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5A	T1=1,5	1P	F80P
M5001/A2	2	.250	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5A	T1=1,5	1P	F80P
M5001/A3	3	.250	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5A	T1=1,5	1P	F80P
M5001/B1	1	.250	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5A	T1=1+7, 3+5	1D	F80D
M5001/B2	2	.250	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5A	T1=1+7, 3+5	1D	F80D
M5001/B3	3	.250	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5A	T1=1+7, 3+5	1D	F80D
M5001/C1	1	.250	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5A	T1=1,7, T2=3,5	2P	F40P
M5001/C2	2	.250	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5A	T1=1,7, T2=3,5	2P	F40P
M5001/C3	3	.250	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5A	T1=1,7, T2=3,5	2P	F40P
M5001/D1	1	.250	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5A	T1=1,5, T2=3,5	2V	F40P
M5001/D2	2	.250	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5A	T1=1,5, T2=3,5	2V	F40P
M5001/D3	3	.250	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5A	T1=1,5, T2=3,5	2V	F40P
M5001/E1	1	.250	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5A	T1=1,5, T2=3,7	PX	F80P
M5001/E2	2	.250	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5A	T1=1,5, T2=3,7	PX	F80P
M5001/E3	3	.250	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5A	T1=1,5, T2=3,7	PX	F80P
M5002/A1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5B	T1=2,6	1P	F80P
M5002/A2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5B	T1=2,6	1P	F80P
M5002/A3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5B	T1=2,6	1P	F80P
M5002/B1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5B	T1=2+7, 3+6	1D	F40D
M5002/B2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5B	T1=2+7, 3+6	1D	F40D
M5002/B3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	5B	T1=2+7, 3+6	1D	F40D
M5002/C1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	5B	T1=2,7 T2=3,6	2P	F40P
M5002/C2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	5B	T1=2,7 T2=3,6	2P	F40P
M5002/C3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.002	7-13Ge	5B	T1=2,7 T2=3,6	2P	F40P
M5003/A1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	6B	T1=2,8	1P	F120P
M5003/A2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	6B	T1=2,8	1P	F120P
M5003/A3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	6B	T1=2,8	1P	F120P
M5003/B1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	6B	T1=2+10, 4+8	1D	F120D
M5003/B2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	6B	T1=2+10, 4+8	1D	F120D
M5003/B3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	6B	T1=2+10, 4+8	1D	F120D
M5003/C1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	6B	T1=2+10, 3+9, 4+8	1T	FB60T
M5003/C2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	6B	T1=2+10, 3+9, 4+8	1T	FB60T
M5003/C3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	6B	T1=2+10, 3+9, 4+8	1T	FB60T
M5003/D1	1	.180	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	6B	T1=2,10 T2=4,8	2P	F80P
M5003/D2	2	.180	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	6B	T1=2,10 T2=4,8	2P	F80P
M5003/D3	3	.180	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	6B	T1=2,10 T2=4,8	2P	F80P
M5004/A1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=2,6	1P	F80P
M5004/A2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=2,6	1P	F80P
M5004/A3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=2,6	1P	F80P
M5004/B1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=1+7, 3+5	1D	F80D
M5004/B2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=1+7, 3+5	1D	F80D
M5004/B3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=1+7, 3+5	1D	F80D
M5004/C1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=1,7 T2=3,5	2P	F40P
M5004/C2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=1,7 T2=3,5	2P	F40P
M5004/C3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=1,7 T2=3,5	2P	F40P
M5004/D1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=1,5 T2=3,5	2V	F40P
M5004/D2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=1,5 T2=3,5	2V	F40P
M5004/D3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=1,5 T2=3,5	2V	F40P
M5004/E1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=4,8 T2=2,6	PX	F80P
M5004/E2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=4,8 T2=2,6	PX	F80P
M5004/E3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=4,8 T2=2,6	PX	F80P
M5004/F1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=1+4, 5+8 T2=2+7, 3+6	DX	F80D
M5004/F2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=1+4, 5+8 T2=2+7, 3+6	DX	F80D
M5004/F3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=1+4, 5+8 T2=2+7, 3+6	DX	F80D
M5004/G1	1	.160	.500	AU/KOVAR	.325	.360	—	R	—	—	—	—	8	T1=2,4 T2=1,4 T3=5,8 T4=7,8	4V	FB20P
M5004/G2	2	.160	.500	AU/KOVAR	.325	.360	.150	R	—	—	—	—	8	T1=2,4 T2=1,4 T3=5,8 T4=7,8	4V	FB20P
M5004/G3	3	.160	.500	AU/KOVAR	.325	.360	.150	W	.187	.187	.020	7-13Ge	8	T1=2,4 T2=1,4 T3=5,8 T4=7,8	4V	FB20P
M5000	1	a/r	a/r	KOVAR	a/r	a/r	a/r	R	a/r	a/r	a/r	7-13Ge	a/r	UP TO FOUR THERMISTORS	a/r	
SERIES	2			AU/KOVAR				E								F20
OPTIONS	3			Ni/KOVAR				W								FB20
	4															F40
																FB40
																F60
																FB60
																F80
																FA80
																F120
																.001" or
																.002"
																THICK

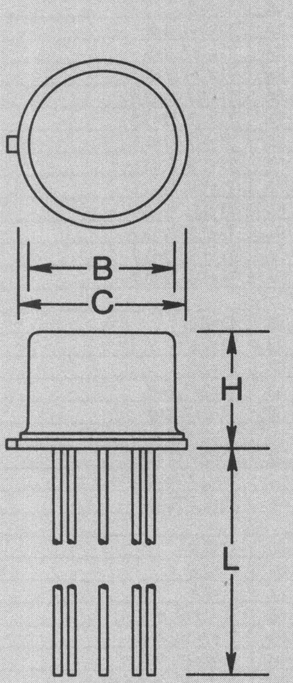


FIGURE 1

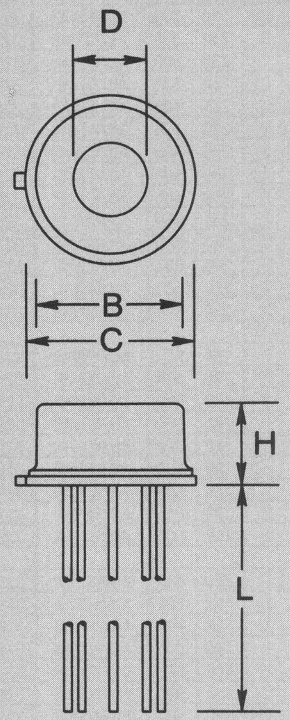


FIGURE 2

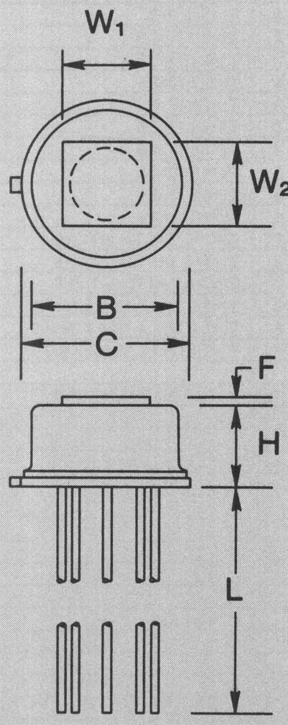


FIGURE 3

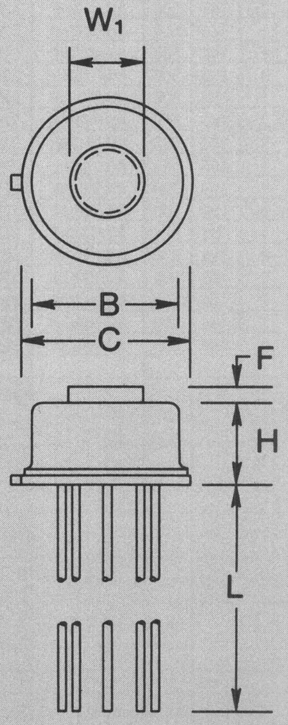
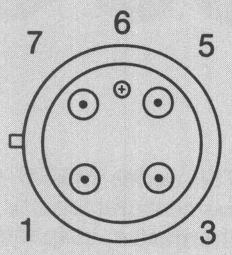
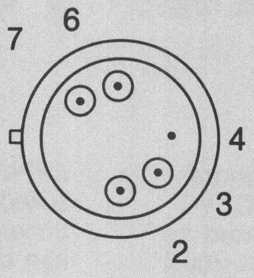


FIGURE 4

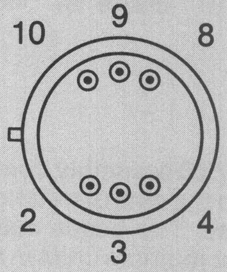
PIN LAYOUT PATTERNS



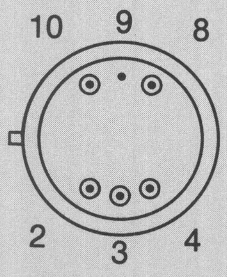
5A



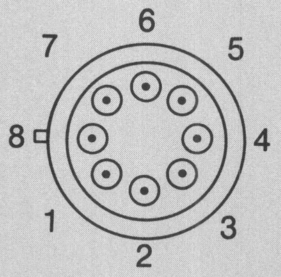
5B



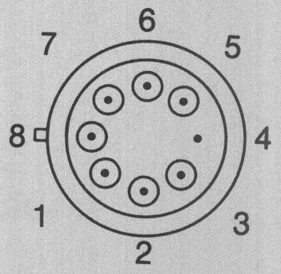
6A



6B

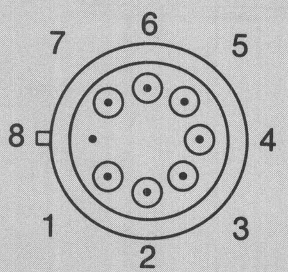


8

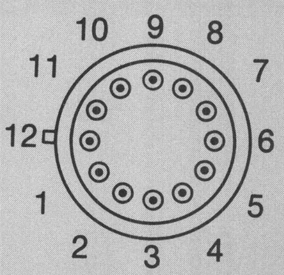


8A

- ⊕ BUTT WELDED TO CASE
- • SHOULDER WELDED TO CASE
- ⊙ THRU PIN WITH MATCHED SEAL



8B

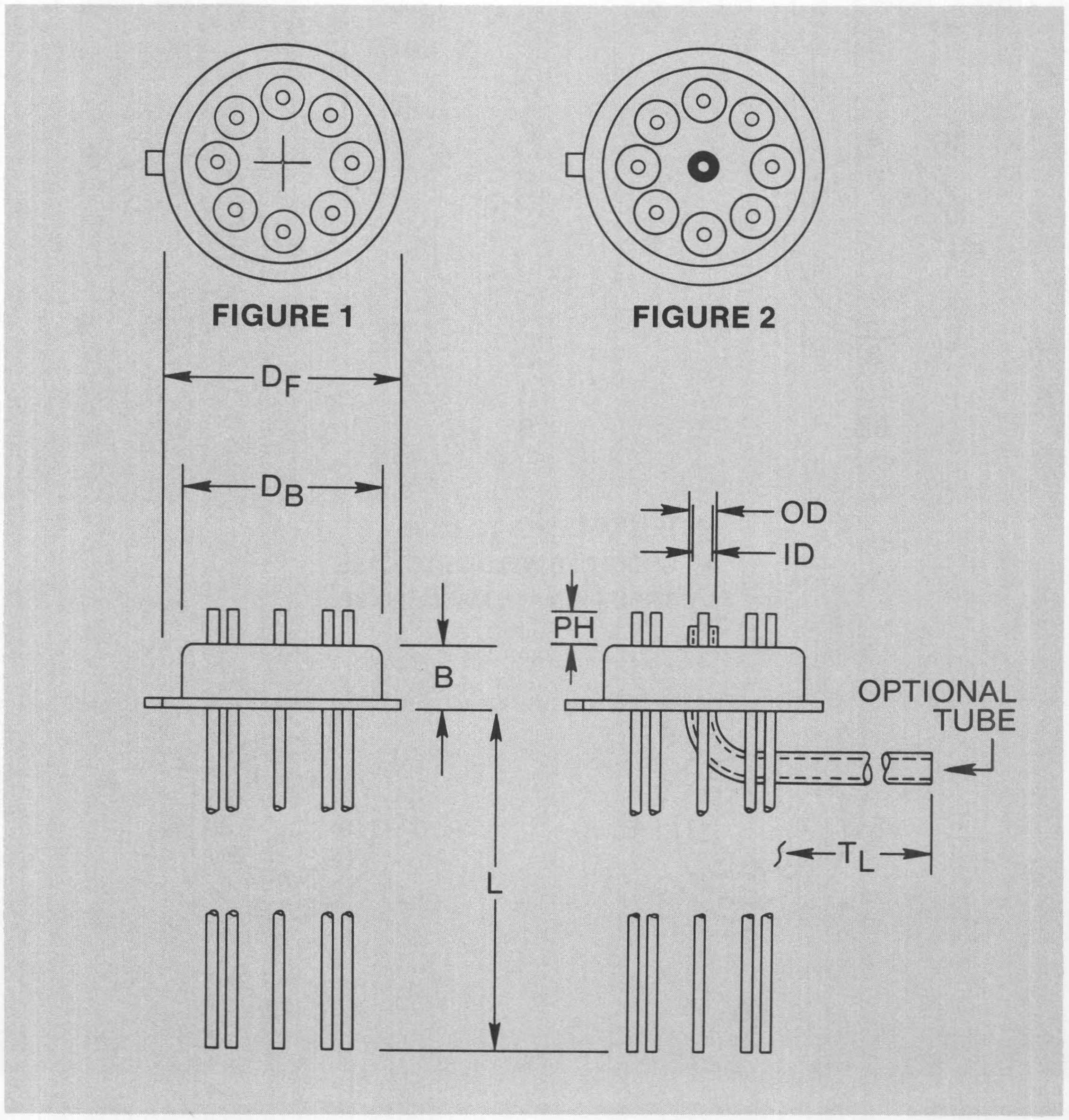


12

SERIES M5500

STYLE: A series M5500 assembly consists of a thermistor bead soldered to the pins of a standard JEDEC "TO" style transistor base. The beads may be mounted as single units, pairs or multiple units in a variety of circuit configurations. The transistor bases and protective caps most commonly used are shown. Other bases or base materials, other pin layouts and other cap styles may be specified upon special order. The protective caps may be removable or may be either epoxied or welded to the base as required.

APPLICATION: The series M5500 assemblies are well suited for many flow measurements or gas analysis applications. The bead thermistor, suspended by its leadwires, can be directly heated or indirectly heated by use of a resistive heating element in these applications. The transistor base provides a convenient, easy to handle mount for general temperature measurement and control applications. The stainless steel tubing used in base figure 2 requires the use of a compression type seal and is only available with the mild steel or hot tin dipped steel base materials.

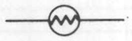


	HEADER							NICKEL CAP			SS 304 TUBING			PIN LAYOUT			
ASSEMBLY PREFIX	FIG	BASE MATERIAL	"L"	"B"	"PH"	"DB"	"DF"	FIG	"DC"	SEAL	"OD"	"ID"	"TL"	#	CIRCUIT CONNECTION	CKT	RECOMMENDED THERMISTOR
M5501/A1	1	AU/KOVAR	500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=1,5	1P	BR55
M5501/A2	1	AU/KOVAR	.500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=1,7 T2=3,5	2P	BR42
M5501/A3	1	AU/KOVAR	.500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=2,5 T2=3,5	2PV	BR32
M5501/A4	1	AU/KOVAR	.500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=1,3 T2=3,5 T3=5,7 T4=7,1	4PB	BR32
M5501/A5	1	AU/KOVAR	.500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=1,7 H=3,5	1PH	BR32
M5501/A6	1	AU/KOVAR	.500	.100	.090	.300	.360	1A	.325	R	—	—	—	5A	T1=1,7 H=3,5	1KH	BR32
M5501/B1	1	AU/KOVAR	.500	.100	.090	.300	.360	2A	.325	R	—	—	—	5A	T1=1,5	1P	BR55
M5502/B2	1	AU/KOVAR	.500	.100	.090	.300	.360	2A	.325	R	—	—	—	5A	T1=1,7 T2=3,5	2K	BR42
M5501/B3	1	AU/KOVAR	.500	.100	.090	.300	.360	2A	.325	R	—	—	—	5A	T1=1,5 T2=3,5	2PV	BR32
M5501/B4	1	AU/KOVAR	.500	.100	.090	.300	.360	2A	.325	R	—	—	—	5A	T1=1,3 T2=3,5 T3=5,7 T4=7,1	4KB	BR32
M5501/C1	1	AU/KOVAR	.500	.100	.090	.300	.360	3A	.325	E	—	—	—	5A	T1=1,5	1P	BR55
M5501/C2	1	AU/KOVAR	.500	.100	.090	.300	.360	3A	.325	E	—	—	—	5A	T1=1,7 T2=3,5	2P	BR42
M5501/C3	1	AU/KOVAR	.500	.100	.090	.300	.360	3A	.325	E	—	—	—	5A	T1=1,5 T2=3,5	2PV	BR32
M5501/D1	1	AU/KOVAR	.500	.100	.090	.300	.360	4A	.325	W	—	—	—	5A	T1=1,5	1P	BR55
M5501/D2	1	AU/KOVAR	.500	.100	.090	.300	.360	4A	.325	W	—	—	—	5A	T1=1,7 T2=3,5	2P	BR42
M5501/D3	1	AU/KOVAR	.500	.100	.090	.300	.360	4A	.325	W	—	—	—	5A	T1=1,7 H=3,5	1PH	BR32
M5501/E1	1	AU/KOVAR	.500	.100	.090	.300	.360	5A	.325	R	—	—	—	5A	T1=1,5	1P	BR55
M5501/E2	1	AU/KOVAR	.500	.100	.090	.300	.360	5A	.325	R	—	—	—	5A	T1=1,3	1K	BR55
M5501/F1	1	AU/KOVAR	.500	.100	.090	.300	.360	6A	.325	W	—	—	—	5A	T1=1,5	1P	BR55
M5501/F2	1	AU/KOVAR	.500	.100	.090	.300	.360	6A	.325	W	—	—	—	5A	T1=1,7 T2=3,5	2K	BR42
M5501/F3	1	AU/KOVAR	.500	.100	.090	.300	.360	6A	.325	W	—	—	—	5A	T1=1,3 T2=3,5	2KV	BR32
M5502/A1	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	5B	T1=2,3	1K	BR55
M5502/A2	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	5B	T1=2,7 T2=3,6	2P	BR42
M5502/A3	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	5B	T1=2,3 T2=6,7	2K	BR42
M5502/A4	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	5B	T1=2,7 H=3,6	1PH	BR42
M5502/B1	1	AU/KOVAR	.500	.100	.050	.300	.360	2A	.325	R	—	—	—	5B	T1=2,6	1P	BR55
M5502/B2	1	AU/KOVAR	.500	.100	.050	.300	.360	2A	.325	R	—	—	—	5B	T1=2,7 T2=3,6	2P	BR42
M5502/C1	1	AU/KOVAR	.500	.100	.050	.300	.360	3A	.325	E	—	—	—	5B	T1=2,3	1K	BR55
M5502/C2	1	AU/KOVAR	.500	.100	.050	.300	.360	3A	.325	E	—	—	—	5B	T1=2,3 T2=6,7	2K	BR42
M5502/D1	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	5B	T1=2,7 T2=3,6	2P	BR42
M5502/D2	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	5B	T1=2,7 H=3,6	1PH	BR42
M5502/E1	1	AU/KOVAR	.500	.100	.050	.300	.360	5A	.325	R	—	—	—	5B	T1=2,3	1K	BR55
M5502/E2	1	AU/KOVAR	.500	.100	.050	.300	.360	5A	.325	R	—	—	—	5B	T1=2,3 T2=6,7	2K	BR42
M5502/F1	1	AU/KOVAR	.500	.100	.050	.300	.360	6A	.325	W	—	—	—	5B	T1=2,6	1P	BR55
M5502/F2	1	AU/KOVAR	.500	.100	.050	.300	.360	6A	.325	W	—	—	—	5B	T1=2,7 T2=3,6	2P	BR42
M5503/A1	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,3	1P	BR55
M5503/A2	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,10 T2=4,8	2P	BR42
M5503/A3	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,10 T2=3,9 T3=4,8	3P	BR42
M5503/A4	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,10 H=4,8	1PH	BR42
M5503/A5	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,10 H=4,8	1KH	BR42
M5503/A6	1	AU/KOVAR	.500	.100	.050	.300	.360	1A	.325	R	—	—	—	6B	T1=2,10 T2=4,8 H=3,9	2PH	BR42
M5503/B1	1	AU/KOVAR	.500	.100	.050	.300	.360	2A	.325	R	—	—	—	6B	T1=2,8	1P	BR55
M5503/B2	1	AU/KOVAR	.500	.100	.050	.300	.360	2A	.325	R	—	—	—	6B	T1=2,4 T2=8,10	2K	BR42
M5503/C1	1	AU/KOVAR	.500	.100	.050	.300	.360	3A	.325	E	—	—	—	6B	T1=2,4	1K	BR55
M5503/C2	1	AU/KOVAR	.500	.100	.050	.300	.360	3A	.325	E	—	—	—	6B	T1=2,4 T2=8,10	2K	BR42
M5503/C3	1	AU/KOVAR	.500	.100	.050	.300	.360	3A	.325	E	—	—	—	6B	T1=2,10 T2=3,9 T3=4,8	3P	BR42
M5503/D1	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	6B	T1=2,8	1P	BR55
M5503/D2	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	6B	T1=2,10 T2=4,8	2P	BR42
M5503/D3	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	6B	T1=2,10 T2=3,9 T3=4,8	3P	BR42
M5503/D4	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	6B	T1=2,10 H=4,8	1PH	BR42
M5503/D5	1	AU/KOVAR	.500	.100	.050	.300	.360	4A	.325	W	—	—	—	6B	T1=2,10 T2=4,8 H=3,9	2PH	BR42
M5503/E1	1	AU/KOVAR	.500	.100	.050	.300	.360	5A	.325	R	—	—	—	6B	T1=2,4	1K	BR55
M5503/E2	1	AU/KOVAR	.500	.100	.050	.300	.360	5A	.325	R	—	—	—	6B	T1=2,10 T2=4,8	2P	BR42
M5503/F1	1	AU/KOVAR	.500	.100	.050	.300	.360	6A	.325	W	—	—	—	6B	T1=2,8	1P	BR55
M5503/F2	1	AU/KOVAR	.500	.100	.050	.300	.360	6A	.325	W	—	—	—	6B	T1=2,10 T2=4,8	2P	BR42
M5504/A1	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T1=1,5	1P	BR55
M5504/A2	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T1=1,3 T2=5,7	2P	BR42
M5504/A3	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T1=1,3 T2=5,7	2K	BR32
M5504/A4	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5504/A5	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T1=1,4 T2=2,4 T3=5,8 T4=5,7	4PV	BR32
M5504/A6	2	SN/STEEL	.500	.060	.090	.300	.360	1A	.325	R	.032	.020	2	8	T1=1,2 T2=2,3 T3=5,6 T4=6,7	4KV	BR23
M5504/B1	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,5	1P	BR55
M5504/B2	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,3 T2=5,7	2P	BR42
M5504/B3	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,3 T2=5,7	2K	BR32
M5504/B4	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5504/B5	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,4 T2=2,4 T3=5,8 T4=5,7	4PV	BR42
M5504/B6	2	SN/STEEL	.500	.060	.090	.300	.360	6A	.325	R	.032	.020	2	8	T1=1,2 T2=2,3 T3=5,6 T4=6,7	4KV	BR23

	HEADER							NICKEL CAP			SS 304 TUBING			PIN LAYOUT			
ASSEMBLY PREFIX	FIG	BASE MATERIAL	"L"	"B"	"PH"	"DB"	"DF"	FIG	"Dc"	SEAL	"OD"	"ID"	"TL"	#	CIRCUIT CONNECTION	CKT	RECOMMENDED THERMISTOR
M5505/A1	1	AU/KOVAR	500	.100	.030	.300	.360	1A	.325	R	—	—	—	8	T1=1,3 T2=5,7	2P	BR32
M5505/A2	1	AU/KOVAR	.500	.100	.030	.300	.360	1A	.325	R	—	—	—	8	T1=1,7 T2=2,6 T3=3,5	3P	BR32
M5505/A3	1	AU/KOVAR	.500	.100	.030	.300	.360	1A	.325	R	—	—	—	8	T1=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5505/A4	1	AU/KOVAR	.500	.100	.030	.300	.360	1A	.325	R	—	—	—	8	T1=1,5 T2=3,5	2PV	BR32
M5505/A5	1	AU/KOVAR	.500	.100	.030	.300	.360	1A	.325	R	—	—	—	8	T1=1,4 T2=2,4 T3=5,8 T4=5,7	4PV	BR32
M5505/B1	1	AU/KOVAR	.500	.100	.030	.300	.360	2A	.325	R	—	—	—	8	T1=1,3 T2=5,7	2K	BR32
M5505/B2	1	AU/KOVAR	.500	.100	.030	.300	.360	2A	.325	R	—	—	—	8	T1=1,2 T2=3,4 T3=5,6	3K	BR23
M5505/B3	1	AU/KOVAR	.500	.100	.030	.300	.360	2A	.325	R	—	—	—	8	T1=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5505/B4	1	AU/KOVAR	.500	.100	.030	.300	.360	2A	.325	R	—	—	—	8	T1=1,5 T2=3,5	2PV	BR32
M5505/B5	1	AU/KOVAR	.500	.100	.030	.300	.360	2A	.325	R	—	—	—	8	T1=1,4 T2=2,4 T3=5,8 T4=5,7	4PV	BR32
M5505/C1	1	AU/KOVAR	.500	.100	.030	.300	.360	3B	.325	E	—	—	—	8	T1=1,3 T2=5,7	2K	BR32
M5505/C2	1	AU/KOVAR	.500	.100	.030	.300	.360	3B	.325	E	—	—	—	8	T1=1,7 T2=2,6 T3=3,5	3P	BR32
M5505/C3	1	AU/KOVAR	.500	.100	.030	.300	.360	3B	.325	E	—	—	—	8	T1=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5505/C4	1	AU/KOVAR	.500	.100	.030	.300	.360	3B	.325	E	—	—	—	8	T1=1,2 T2=2,3 T3=5,6 T4=6,7	4KV	BR23
M5505/C5	1	AU/KOVAR	.500	.100	.030	.300	.360	3B	.325	E	—	—	—	8	T1=1,3 H=4,8	1KH	BR32
M5505/D1	1	AU/KOVAR	.500	.100	.030	.300	.360	4B	.325	W	—	—	—	8	T1=1,3 T2=5,7	2P	BR32
M5505/D2	1	AU/KOVAR	.500	.100	.030	.300	.360	4B	.325	W	—	—	—	8	T1=1,7 T2=2,6 T3=3,5	3P	BR32
M5505/D3	1	AU/KOVAR	.500	.100	.030	.300	.360	4B	.325	W	—	—	—	8	T1=1,3 H=4,8	1PH	BR32
M5505/D4	1	AU/KOVAR	.500	.100	.030	.300	.360	4B	.325	W	—	—	—	8	T1=1,3 T2=5,7 H=4,8	2PH	BR32
M5505/E1	1	AU/KOVAR	.500	.100	.030	.300	.360	5A	.325	R	—	—	—	8	T1=1,3 T2=5,7	2P	BR32
M5505/E2	1	AU/KOVAR	.500	.100	.030	.300	.360	5A	.325	R	—	—	—	8	T1=1,2 T2=3,4 T3=5,6 T4=7,8	4K	BR23
M5505/E3	1	AU/KOVAR	.500	.100	.030	.300	.360	5A	.325	R	—	—	—	8	T1=1,2 T2=2,3 T3=5,6 T4=6,7	4KV	BR23
M5505/F1	1	AU/KOVAR	.500	.100	.030	.300	.360	6B	.325	W	—	—	—	8	T1=1,3 T2=5,7	2P	BR32
M5505/F2	1	AU/KOVAR	.500	.100	.030	.300	.360	6B	.325	W	—	—	—	8	T1=1,4 T2=2,4 T3=5,8 T4=5,7	4PV	BR32
M5500	1	KOVAR	a/r	a/r	a/r	a/r	a/r	1	a/r	R	a/r	a/r	a/r	a/r	UP TO FOUR ELEMENTS	a/r	BB05
SERIES	2	AU/KOVAR						2		E							BB07
OPTIONS		Ni/KOVAR						3		W							BB11
		MILD STEEL						4									B05
		SN/STEEL						5									B07
								6									B10
																	B14
																	B35
																	B43
																	BR11
																	BR14
																	BR16
																	BR23
																	BR32
																	BR42
																	BR55

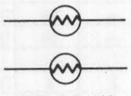
CIRCUIT SCHEMATICS

(1) THERMISTOR



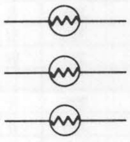
1P, 1J, 1K

(2) THERMISTORS



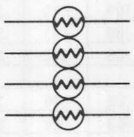
2P, 2J, 2K

(3) THERMISTORS



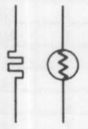
3P, 3J, 3K

(4) THERMISTORS



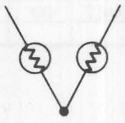
4P, 4J, 4K

(1) THERMISTOR AND HEATER



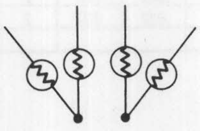
PH, JH, KH

(1) DIVIDER CIRCUIT



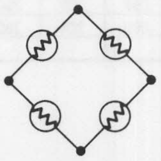
2PV, 2JV, 2KV

(2) DIVIDER CIRCUITS



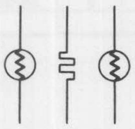
4PV, 4JV, 4KV

FULL BRIDGE CIRCUIT

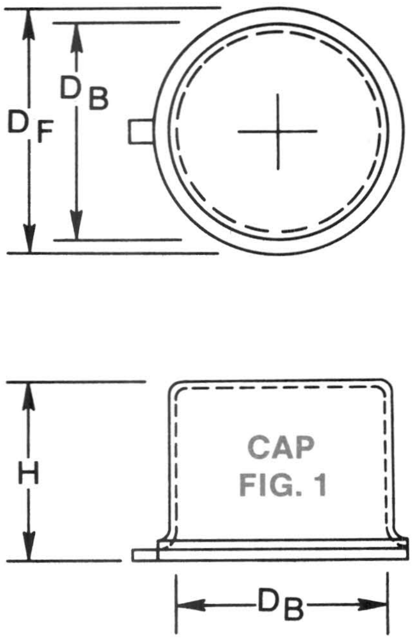


4PB, 4JB, 4KB

(2) THERMISTORS AND HEATER

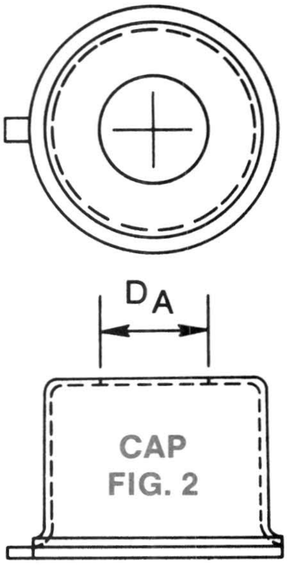


2PH, 2JH, 2 KH



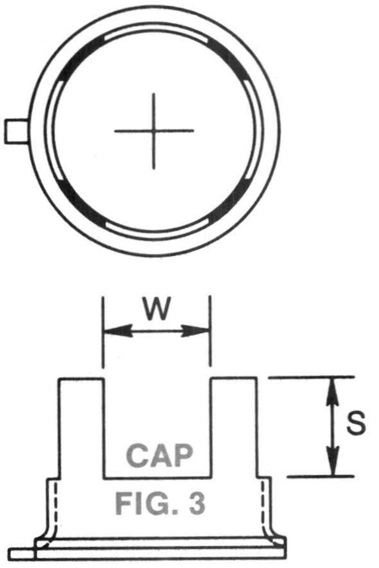
CAP
FIG. 1

	STYLE	H
1A	TO-5	.250
1B	TO-5	.180
1C	TO-5	.160



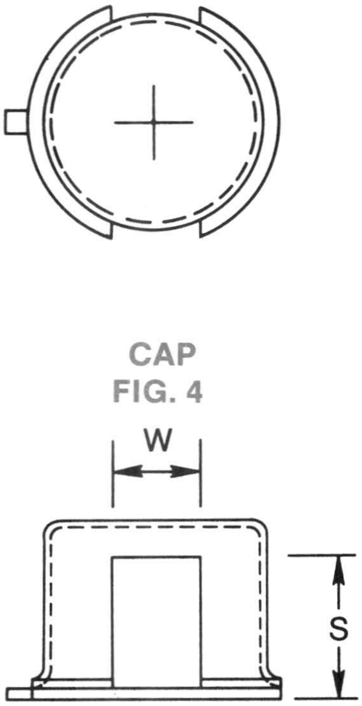
CAP
FIG. 2

	STYLE	H	D_A
2A	TO-5	.250	.150
2B	TO-5	.180	.150
2C	TO-5	.160	.150



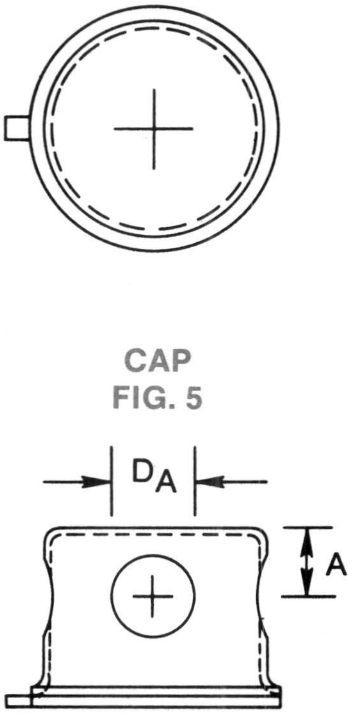
CAP
FIG. 3

	STYLE	H	W	S
3A	TO-5	.250	.125	.125
3B	TO-5	.180	.125	.080
3C	TO-5	.160	.125	.060



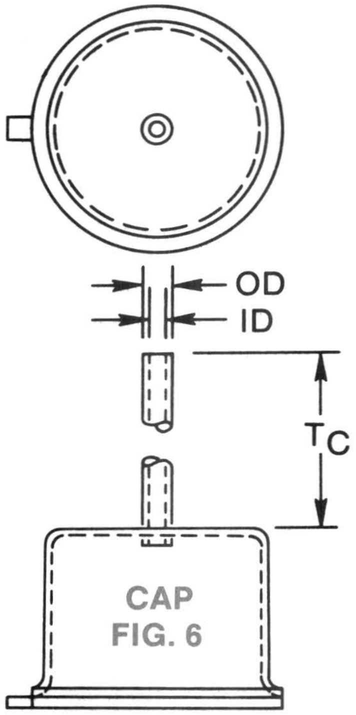
CAP
FIG. 4

	STYLE	H	W	S
4A	TO-5	.250	.125	.200
4B	TO-5	.180	.125	.150
4C	TO-5	.160	.125	.130



CAP
FIG. 5

	STYLE	H	D_A	A
5A	TO-5	.250	.100	.100
5B	TO-5	.180	.063	.050
5C	TO-5	.160	.040	.040



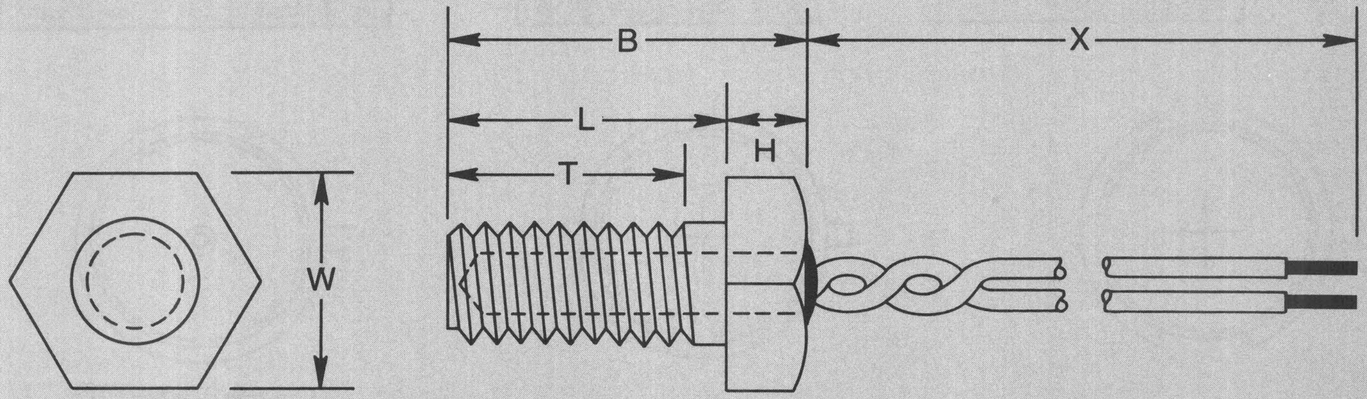
CAP
FIG. 6

	STYLE	H	OD	ID	T_C
6A	TO-5	.250	.032	.020	.250
6B	TO-5	.180	.032	.020	.250
6C	TO-5	.160	.032	.020	.250

SERIES M6000

STYLE: A series M6000 assembly consists of a bead, probe or a chip thermistor attached to insulated hook up wires and encapsulated into a hex head machine screw. The hex head machine screw can be made of one of the standard materials listed, can be one of the basic thread series listed and can be one of the basic sizes shown. Not all combinations of material, thread series and size are compatible. The machined screws can be partially or fully threaded depending upon length.

APPLICATION: The series M6000 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement and control applications.The wide assortment of lengths, sizes, threads and materials which are available permit these assemblies to be used in all types of engine block or surface measurements. The blind drilled hole in the screw provides maximum protection for the thermistor from harsh environments such as conductive or corrosive fluids. Since the machine screw threads are straight rather than tapered, the assemblies should not be used where a pressure seal is required unless sealing rings, washers or glands are also used.



THERMOMETRICS INC.

ASSEMBLY PREFIX	SURFACE SENSOR MOUNT							EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	THREAD	MTL.	B	L	T	H	W	X	GA.	ALLOY	INSULATION			
M6001/A1	6-32UNC 2A	SS304	15/32	3/8	3/8	3/32	5/16	48	30	OFHC	KYNAR	EPOXY	125	BR42 MC50
M6001/A2	6-32UNC 2A	SS304	19/32	1/2	1/2	3/32	5/16	48	30	OFHC	KYNAR	EPOXY	125	BR42 MC50
M6001/A3	6-32UNC 2A	SS304	23/32	5/8	1/2	3/32	5/16	48	30	OFHC	KYNAR	EPOXY	125	BR42 MC50
M6002/A1	8-32UNC 2A	SS304	1/2	3/8	3/8	1/8	11/32	48	30	TC	PVC	EPOXY	105	BR55
M6002/A2	8-32UNC 2A	SS304	5/8	1/2	1/2	1/8	11/32	48	30	TC	PVC	EPOXY	105	P60A
M6002/A3	8-32UNC 2A	SS304	3/4	5/8	9/16	1/8	11/32	48	30	TC	PVC	EPOXY	105	P60B
M6002/A4	8-32UNC 2A	SS304	7/8	3/4	9/16	1/8	11/32	48	30	TC	PVC	EPOXY	105	P60D
M6002/B1	8-32UNC 2A	SS304	1/2	3/8	3/8	1/8	11/32	48	30	SPC	TFE	EPOXY	200	BR55
M6002/B2	8-32UNC 2A	SS304	5/8	1/2	1/2	1/8	11/32	48	30	SPC	TFE	EPOXY	200	P60A
M6002/B3	8-32UNC 2A	SS304	3/4	5/8	9/16	1/8	11/32	48	30	SPC	TFE	EPOXY	200	P60B
M6002/B4	8-32UNC 2A	SS304	7/8	3/4	9/16	1/8	11/32	48	30	SPC	TFE	EPOXY	200	P60D
M6003/A1	10-32UNF 2A	SS304	1/2	3/8	3/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	BR55
M6003/A2	10-32UNF 2A	SS304	5/8	1/2	1/2	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65A
M6003/A3	10-32UNF 2A	SS304	3/4	5/8	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65B
M6003/A4	10-32UNF 2A	SS304	7/8	3/4	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65D
M6003/A5	10-32UNF 2A	SS304	1-1/8	1	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65D
M6003/B1	10-32UNF 2A	SS304	1/2	3/8	3/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	BR55
M6003/B2	10-32UNF 2A	SS304	5/8	1/2	1/2	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65A
M6003/B3	10-32UNF 2A	SS304	3/4	5/8	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65B
M6003/B4	10-32UNF 2A	SS304	7/8	3/4	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65D
M6003/B5	10-32UNF 2A	SS304	1-1/8	1	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65D
M6004/A1	10-24UNC 2A	SS304	1/2	3/8	3/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	BR55
M6004/A2	10-24UNC 2A	SS304	5/8	1/2	1/2	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65A
M6004/A3	10-24UNC 2A	SS304	3/4	5/8	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65B
M6004/A4	10-24UNC 2A	SS304	7/8	3/4	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65D
M6004/A5	10-24UNC 2A	SS304	1-1/8	1	5/8	1/8	3/8	48	28	TC	PVC	EPOXY	105	P65D
M6004/B1	10-24UNC 2A	SS304	1/2	3/8	3/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	BR55
M6004/B2	10-24UNC 2A	SS304	5/8	1/2	1/2	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65A
M6004/B3	10-24UNC 2A	SS304	3/4	5/8	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65B
M6004/B4	10-24UNC 2A	SS304	7/8	3/4	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65D
M6004/B5	10-24UNC 2A	SS304	1-1/8	1	5/8	1/8	3/8	48	28	SPC	TFE	EPOXY	200	P65D
M6005/A1	1/4-28UNF 2A	SS304	21/32	1/2	1/2	5/32	7/16	48	24	TC	PVC	EPOXY	105	BR55 DC95
M6005/A2	1/4-28UNF 2A	SS304	25/32	5/8	5/8	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85A P100A
M6005/A3	1/4-28UNF 2A	SS304	29/32	3/4	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85B P100B
M6005/A4	1/4-28UNF 2A	SS304	1-1/32	7/8	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85D P100D
M6005/A5	1/4-28UNF 2A	SS304	1-5/32	1	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85D P100D
M6005/B1	1/4-28UNF 2A	SS304	21/32	1/2	1/2	5/32	7/16	48	24	SPC	TFE	EPOXY	200	BR55
M6005/B2	1/4-28UNF 2A	SS304	25/32	5/8	5/8	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85A P100A
M6005/B3	1/4-28UNF 2A	SS304	29/32	3/4	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85B P100B
M6005/B4	1/4-28UNF 2A	SS304	1-1/32	7/8	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85D P100D
M6005/B5	1/4-28UNF 2A	SS304	1-5/32	1	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85D P100D
M6006/A1	1/4-20UNC 2A	SS304	17/32	3/8	3/8	5/32	7/16	48	24	TC	PVC	EPOXY	105	BR55 DC95
M6006/A2	1/4-20UNC 2A	SS304	21/32	1/2	1/2	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85A P100A
M6006/A3	1/4-20UNC 2A	SS304	25/32	5/8	5/8	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85B P100B
M6006/A4	1/4-20UNC 2A	SS304	29/32	3/4	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85D P100D
M6006/A5	1/4-20UNC 2A	SS304	1-1/32	7/8	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85D P100D
M6006/A6	1/4-20UNC 2A	SS304	1-5/32	1	3/4	5/32	7/16	48	24	TC	PVC	EPOXY	105	P85D P100D
M6006/B1	1/4-20UNC 2A	SS304	17/32	3/8	3/8	5/32	7/16	48	24	SPC	TFE	EPOXY	200	BR55
M6006/B2	1/4-20UNC 2A	SS304	21/32	1/2	1/2	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85A P100A
M6006/B3	1/4-20UNC 2A	SS304	25/32	5/8	5/8	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85B P100B
M6006/B4	1/4-20UNC 2A	SS304	29/32	3/4	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85D P100D
M6006/B5	1/4-20UNC 2A	SS304	1-1/32	7/8	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85D P100D
M6006/B6	1/4-20UNC 2A	SS304	1-5/32	1	3/4	5/32	7/16	48	24	SPC	TFE	EPOXY	200	P85D P100D
M6007/A1	5/16-24UNF 2A	SS304	45/64	1/2	1/2	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85A PAIRS
M6007/A2	5/16-24UNF 2A	SS304	53/64	5/8	5/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85B PAIRS
M6007/A3	5/16-24UNF 2A	SS304	61/64	3/4	3/4	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6007/A4	5/16-24UNF 2A	SS304	1-5/64	7/8	7/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6007/A5	5/16-24UNF 2A	SS304	1-13/64	1	7/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6007/B1	5/16-24UNF 2A	SS304	45/64	1/2	1/2	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85A PAIRS
M6007/B2	5/16-24UNF 2A	SS304	53/64	5/8	5/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85B PAIRS
M6007/B3	5/16-24UNF 2A	SS304	61/64	3/4	3/4	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS
M6007/B4	5/16-24UNF 2A	SS304	1-5/64	7/8	7/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS
M6007/B5	5/16-24UNF 2A	SS304	1-13/64	1	7/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS

ASSEMBLY PREFIX	SURFACE SENSOR MOUNT							EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	THREAD	MTL.	B	L	T	H	W	X	GA.	ALLOY	INSULATION			
M6008/A1	5/16-18UNC 2A	SS304	45/64	1/2	1/2	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85A PAIRS
M6008/A2	5/16-18UNC 2A	SS304	53/64	5/8	5/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85B PAIRS
M6008/A3	5/16-18UNC 2A	SS304	61/64	3/4	3/4	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6008/A4	5/16-18UNC 2A	SS304	1-5/64	7/8	7/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6008/A5	5/16-18UNC 2A	SS304	1-13/64	1	7/8	13/64	1/2	48	22	TC	PVC	EPOXY	105	P85D PAIRS
M6008/B1	5/16-18UNC 2A	SS304	45/64	1/2	1/2	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85A PAIRS
M6008/B2	5/16-18UNC 2A	SS304	53/64	5/8	5/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85B PAIRS
M6008/B3	5/16-18UNC 2A	SS304	61/64	3/4	3/4	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS
M6008/B4	5/16-18UNC 2A	SS304	1-5/64	7/8	7/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS
M6008/B5	5/16-18UNC 2A	SS304	1-13/64	1	7/8	13/64	1/2	48	22	SPC	TFE	EPOXY	200	P85D PAIRS
	-"SERIES"-													
M6000	UNC	SS304	a/r	a/r	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR16
SERIES	UNF	SS316							30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	UNEF	BRASS							28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
	METRIC	ALUM.							26	NPC	KYNAR		125	BR42
		NYLON							24	OFHC	FIBERGLASS		175	BR55
	-"SIZES"-	PVC							22	Ni	SIL. RUBBER		200	
	#6 - #12	TEFLON							20		KAPTON		260	MC50
	1/4" - 1/2"	TITANIUM							18		POLYETHYLENE		300	DC95
	6mm - 20mm	STEEL												
														P20
														P25
														P30
														P60
														P65
														P85
														P100
														CTP's
														HTP's
														SP's

SPECIAL ASSEMBLY DESIGN:

The assemblies and mounts shown in the Sensor Handbook represent basic constructions which are suitable for a wide variety of applications. For a more specific application, however, a custom assembly can be designed by using the listing of standard materials and specifying the appropriate dimensions and/or features. Thermometrics' Applications Engineers are ready and willing to assist the designer in materials selection and packaging.

Please note that such custom assemblies are not truly unique or different if they can be constructed from the basic materials listed in this Sensor Handbook. Most of the materials and enclosures shown in the Sensor Handbook are stocked so that assembly lead-times can be held to a minimum. When special materials or special fabrications are required, the designer should allow for additional assembly lead-time and anticipate higher costs.

In certain cases, the customer may provide special materials or components to Thermometrics Inc. for inclusion in a custom assembly. Such customer supplied materials may provide a savings in time, expense or both for special orders. Please contact our Applications Engineering department for additional information and assistance regarding materials selection and/or customer supplied materials or hardware.

TEMPERATURE RATING:

The maximum temperature for continuous operation of the thermistor is given in the Thermistor Catalog and is also given in the Selection Guide. Normally, this temperature will be higher than the temperature rating on such items as the wire insulation, encapsulation material, tubing or non-metallic housing materials.

The assemblies shown in the Sensor Handbook have a maximum temperature rating which is consistent with the materials selected. Higher temperatures may be accommodated by appropriate changes in materials used for the assembly.

For special assemblies where high or low temperature conditions will be experienced, it is desirable to contact our Applications Engineering department to insure that materials are selected which can satisfy the conditions.

THREADS:

Threaded bodies for surface mount assemblies and threaded hubs for immersion assemblies are available in all standard sizes and classifications.

The Sensor Handbook shows the most common threaded bodies and hubs in the options listing for each assembly type. Other threads and thread lengths may be specified for custom assemblies except that thread diameters and pitches will be governed by industry standards. A partial listing of thread types which are available for thermistor assemblies is as follows:

NC/UNC	NF/UNF
4 - 40	4 - 48
5 - 40	5 - 44
6 - 32	6 - 40
8 - 32	8 - 36
10 - 24	10 - 32
12 - 24	12 - 28
1/4 - 20	1/4 - 28
5/16 - 18	5/16 - 24
3/8 - 16	3/8 - 24
7/16 - 14	7/16 - 20
1/2 - 12	1/2 - 20

NEF/UNEF	NPT
12 -32	1/16 -27
1/4 - 32	1/8 - 27
5/16 - 32	1/4 - 18
3/8 - 32	3/8 - 18
7/16 - 28	1/2 - 14
1/2 - 28	

EXTENSION LEADS:

Extension leads are available in many conductor alloys, gauge sizes, insulations and constructions. Obviously, not all combinations are readily available and not all combinations are suitable for certain assemblies. The physical dimensions, electrical characteristics and thermal properties of an extension lead or cable must be given appropriate consideration in any special design problem.

The wires and cables which are listed in this Sensor Handbook represent the most commonly available extension leads. Most are stocked at Thermometrics Inc. to expedite delivery on assemblies, whether the assembly is a standard design or a custom design. Other wires and cables may be specified if desired, assuming that they can be manufactured, however, there will be a minimum purchase requirement for such special wires and cables. This can be quite costly in many cases and should only be considered when the quantity of assemblies to be manufactured is reasonably large.

TERMINATIONS:

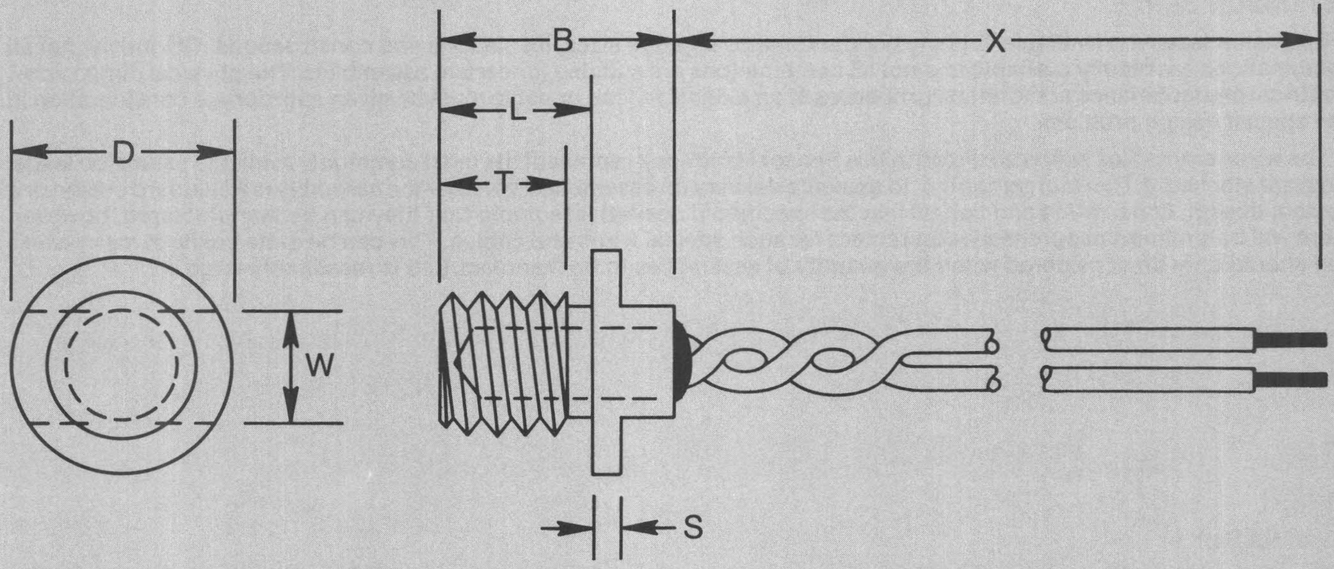
The standard termination which is shown on most of the assemblies in the Sensor Handbook is a length of extension leads or cable which is cut and stripped. Connectors, plugs or receptacles may be added to the extension leads as required or may even be built into the housing on special order.

As such, the customer can specify virtually any connecter, plug or receptacle to mate with existing circuit connections.

SERIES M6500

STYLE: A series M6500 assembly consists of a bead, a probe or a chip thermistor attached to insulated hook up wires and encapsulated into a threaded housing. The housing is basically cylindrical with milled wrench flats on the body and a short threaded section with an undercut to permit precise positioning of the sensor package. The housing dimensions are selected as required to satisfy applications where space is critical. The thread series, sizes and materials may be selected from the listings shown provided that the desired combinations are compatible.

APPLICATION: The series M6500 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement and control applications where mounting space is a critical consideration. The wide assortment of lengths, sizes, threads and materials which are available permit these assemblies to be used in all types of engine block or surface measurements. The blind drilled hole in the housing provides maximum protection for the thermistor from harsh environments such as conductive or corrosive fluids. Since the housing threads are straight rather than tapered, the assemblies should not be used where a pressure seal is required unless sealing rings, washers or glands are also used.

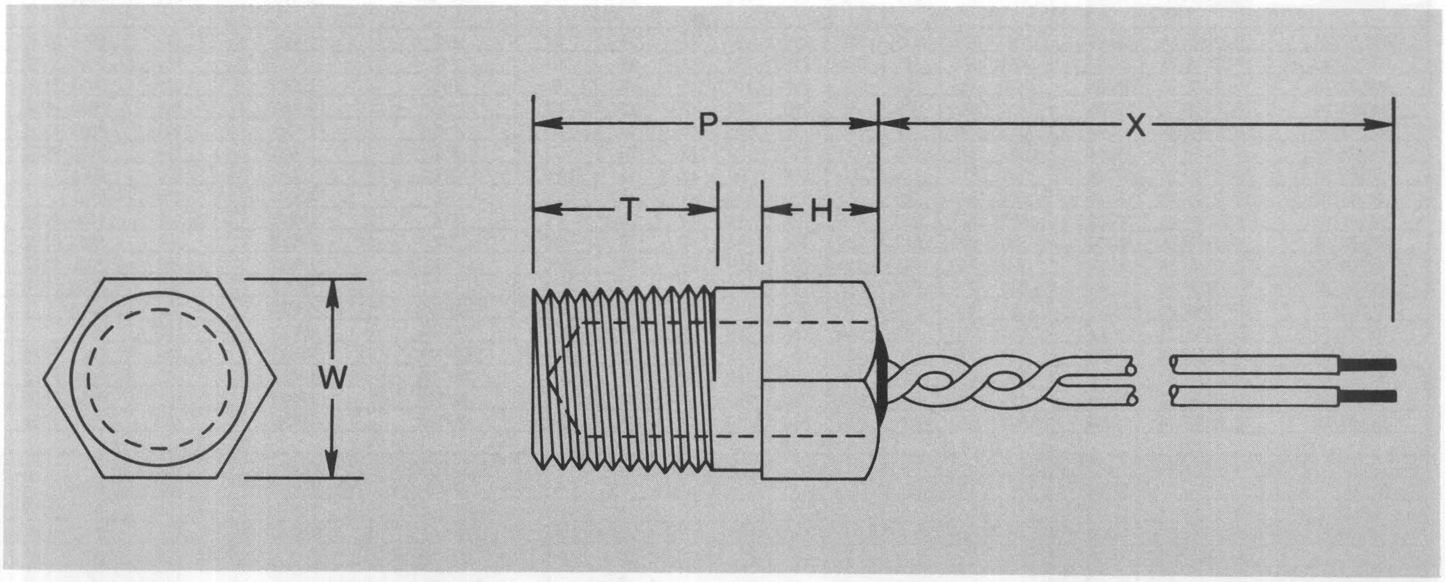


ASSEMBLY PREFIX	SURFACE SENSOR MOUNT								EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	THREAD	MATERIAL	B	L	T	S	D	W	X	GA.	ALLOY	INSULATION			
M6501/A1	6-32UNC 2A	SS304	.260	.170	.125	.030	.250	.125	48	30	OFHC	KYNAR	EPOXY	125	BR42
M6501/A2	6-32UNC 2A	SS304	.375	.285	.250	.030	.250	.125	48	30	OFHC	KYNAR	EPOXY	125	BR42
M6501/A3	6-32UNC 2A	SS304	.500	.410	.375	.030	.250	.125	48	30	OFHC	KYNAR	EPOXY	125	BR42
M6501/B1	6-32UNC 2A	SS304	.260	.170	.125	.030	.250	.125	48	30	SPC	KAPTON	EPOXY	200	BR42
M6501/B2	6-32UNC 2A	SS304	.375	.285	.250	.030	.250	.125	48	30	SPC	KAPTON	EPOXY	200	BR42
M6501/B3	6-32UNC 2A	SS304	.500	.410	.375	.030	.250	.125	48	30	SPC	KAPTON	EPOXY	200	BR42
M6502/A1	8-32UNC 2A	SS304	.260	.170	.125	.030	.250	.125	48	30	TC	PVC	EPOXY	105	BR55 MC50
M6502/A2	8-32UNC 2A	SS304	.375	.285	.250	.030	.250	.125	48	30	TC	PVC	EPOXY	105	BR55 MC50
M6502/A3	8-32UNC 2A	SS304	.500	.410	.375	.030	.250	.125	48	30	TC	PVC	EPOXY	105	BR55 MC50
M6502/A4	8-32UNC 2A	SS304	.625	.535	.500	.030	.250	.125	48	30	TC	PVC	EPOXY	105	P60B
M6502/A5	8-32UNC 2A	SS304	.750	.660	.625	.030	.250	.125	48	30	TC	PVC	EPOXY	105	P60B
M6502/A6	8-32UNC 2A	SS304	.875	.785	.750	.030	.250	.125	48	30	TC	PVC	EPOXY	105	P60D
M6502/A7	8-32UNC 2A	SS304	1.000	.910	.875	.030	.250	.125	48	30	TC	PVC	EPOXY	105	P60D
M6502/B1	8-32UNC 2A	SS304	.260	.170	.125	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	BR55
M6502/B2	8-32UNC 2A	SS304	.375	.285	.250	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	BR55
M6502/B3	8-32UNC 2A	SS304	.500	.410	.375	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	BR55
M6502/B4	8-32UNC 2A	SS304	.625	.535	.500	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	P60A
M6502/B5	8-32UNC 2A	SS304	.750	.660	.625	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	P60B
M6502/B6	8-32UNC 2A	SS304	.875	.785	.750	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	P60D
M6502/B7	8-32UNC 2A	SS304	1.000	.910	.875	.030	.250	.125	48	30	SPC	TFE	EPOXY	200	P60D
M6502/C1	8-32UNC 2A	SS304	.260	.170	.125	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	BR55
M6502/C2	8-32UNC 2A	SS304	.375	.285	.250	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	BR55
M6502/C3	8-32UNC 2A	SS304	.500	.410	.375	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	BR55
M6502/C4	8-32UNC 2A	SS304	.625	.535	.500	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	P60A
M6502/C5	8-32UNC 2A	SS304	.750	.660	.625	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	P60B
M6502/C6	8-32UNC 2A	SS304	.875	.785	.750	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	P60D
M6502/C7	8-32UNC 2A	SS304	1.000	.910	.875	.030	.250	.125	48	28	SPC	KAPTON	EPOXY	200	P60D
M6503/A1	10-32UNF 2A	SS304	.500	.410	.375	.030	.250	.190	48	28	TC	PVC	EPOXY	105	BR55 MC50
M6503/A2	10-32UNF 2A	SS304	.590	.500	.465	.030	.250	.190	48	28	TC	PVC	EPOXY	105	BR55 MC50
M6503/A3	10-32UNF 2A	SS304	.625	.535	.500	.030	.250	.190	48	28	TC	PVC	EPOXY	105	P65A P85A
M6503/A4	10-32UNF 2A	SS304	.750	.660	.625	.030	.250	.190	48	28	TC	PVC	EPOXY	105	P65B P85B
M6503/A5	10-32UNF 2A	SS304	.875	.785	.750	.030	.250	.190	48	28	TC	PVC	EPOXY	105	P65D P85D
M6503/A6	10-32UNF 2A	SS304	1.000	.910	.875	.030	.250	.190	48	28	TC	PVC	EPOXY	105	P65D P85D
M6503/B1	10-32UNF 2A	SS304	.500	.410	.375	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	BR55
M6503/B2	10-32UNF 2A	SS304	.590	.500	.465	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	BR55
M6503/B3	10-32UNF 2A	SS304	.625	.535	.500	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	P65A P85A
M6503/B4	10-32UNF 2A	SS304	.750	.660	.625	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	P65B P85B
M6503/B5	10-32UNF 2A	SS304	.875	.785	.750	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	P65D P85D
M6503/B6	10-32UNF 2A	SS304	1.000	.910	.875	.030	.250	.190	48	28	SPC	TFE	EPOXY	200	P65D P85D
M6503/C1	10-32UNF 2A	SS304	.500	.410	.375	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	BR55
M6503/C2	10-32UNF 2A	SS304	.590	.500	.465	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	BR55
M6503/C3	10-32UNF 2A	SS304	.625	.535	.500	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	P65A P85A
M6503/C4	10-32UNF 2A	SS304	.750	.660	.625	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	P65B P85B
M6503/C5	10-32UNF 2A	SS304	.875	.785	.750	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	P65D P85D
M6503/C6	10-32UNF 2A	SS304	1.000	.910	.875	.030	.250	.190	48	24	SPC	KAPTON	EPOXY	200	P65D P85D
	— SERIES —														
M6500	UNC	SS304	a/r	a/r	a/r	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR16
SERIES	UNF	SS316								30	BC	TEFLON (TFE)	RTV	80	BR23
OPTIONS	UNEF	BRASS								28	SPC	TEFLON (FEP)	CERAMIC	105	BR32
	METRIC	ALUM.								26	NPC	KYNAR		125	BR42
		NYLON								24	OFHC	FIBERGLASS		175	BR55
	— SIZES —	PVC								22	Ni	SIL. RUBBER		200	
	#6 - #12	TEFLON								20		KAPTON		260	MC50
	1/4 - 1/2	TITANIUM								18		POLYETHYLENE		300	DC95
	6mm - 20mm	STEEL													
															P20
															P25
															P30
															P60
															P65
															P85
															P100
															CTP's
															HTP's
															SP's

SERIES M7000

STYLE: A series M7000 assembly consists of a bead, a probe or a chip thermistor, attached to insulated hook up wires and encapsulated into a tapered pipe plug. The tapered thread can be one of the basic sizes listed and the plug body can be one of the materials listed. The external thread length and minimum hex head dimensions are normally fixed by industry standards, however, other dimensions may be specified upon special order.

APPLICATION: The series M7000 assemblies are extremely rugged sensor packages that can be used in many general temperature measurement and control applications. The tapered thread provides a leak-tight seal so that these assemblies may be used in applications where high pressures or fluids are present. The blind drilled hole provides maximum protection for the thermistor from harsh environments such as conductive or corrosive fluids.



THERMOMETRICS INC.

ASSEMBLY PREFIX	SURFACE SENSOR MOUNT						EXTENSION LEADS				ENCAPSULANT	MAX. TEMP.	RECOMMENDED THERMISTOR
	PIPE THD.	MTL.	P	T	H	W	X	GA.	ALLOY	INSULATION			
M7001/A1	1/16 - 27NPT	SS304	3/4	.3896	1/4	5/16	48	24	TC	PVC	EPOXY	105	P60B PAIRS
M7001/B1	1/16 - 27NPT	SS304	3/4	.3896	1/4	5/16	48	24	SPC	TFE	EPOXY	200	P60B PAIRS
M7002/A1	1/8 - 27NPT	SS304	3/4	.3924	1/4	7/16	48	22	TC	PVC	EPOXY	105	P85B PAIRS
M7002/B1	1/8 - 27NPT	SS304	3/4	.3924	1/4	7/16	48	22	SPC	TFE	EPOXY	200	P85B PAIRS
M7003/A1	1/4 - 18NPT	SS304	1	.5946	1/4	9/16	48	20	TC	PVC	EPOXY	105	P100B PAIRS
M7003/B1	1/4 - 18NPT	SS304	1	.5946	1/4	9/16	48	20	SPC	TFE	EPOXY	200	P100B PAIRS
M7000	1/16 - 27NPT	SS304	a/r	a/r	a/r	a/r	a/r	32	TC	PVC	EPOXY	60	BR32
SERIES	1/8 - 27NPT	SS316						30	BC	TEFLON (TFE)	RTV	80	BR42
OPTIONS	1/4 - 18NPT	BRASS						28	SPC	TEFLON (FEP)	CERAMIC	105	BR55
	3/8 - 18NPT	ALUM.						26	NPC	KYNAR		125	
	1/2 - 14NPT							24	OFHC	FIBERGLASS		175	MC50
								22	Ni	SIL. RUBBER		200	DC95
								20		KAPTON		260	
								18		POLYETHYLENE		300	P60
													P65
													P85
													P100
													HTP's
													CTP's
													SP's

EXTENSION LEADS: HOOK UP WIRE

Hook up wire extension leads are the most basic type of assembly termination. The leads are normally larger gauge sizes and are stranded, plated conductors with heavy insulation wall thicknesses. They are used in medium to large assemblies and provide an easy solder or splice connection to external circuitry.

Thermometrics Inc. maintains stock on many of the wire types specified in MIL-W-16878, especially on Teflon and PVC insulated hook up wires. Other MIL specification hook up wires or special wire constructions may be ordered for custom assemblies as desired.

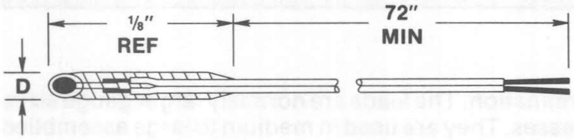
The following listing gives some of the typical materials available. Please note that not all combinations are available. Check factory for availability.

GAUGE SIZES:	18 20 22 24 26 28 30 32
CONSTRUCTION:	SOLID STRANDED
ALLOYS:	BARE COPPER TINNED COPPER SILVER PLATED COPPER NICKEL PLATED COPPER OFHC COPPER NICKEL DUMET
INSULATIONS:	TEFLON - TFE TEFLON - FEP POLYVINYL CHLORIDE - PVC SILICONE RUBBER POLYIMIDE FIBERGLASS POLYETHYLENE POLYALKENE FLUOROCARBON/POLYIMIDE KYNAR TEFZEL

ASSEMBLIES

SERIES AB6 THERMOBEAD AND THERMOPROBE ASSEMBLIES

STYLE:
Series AB6 thermistor assemblies consist of small Thermoprobes or Thermobeads which are welded to insulated extension leads. The Thermobeads or Thermoprobes are hermetically sealed in glass and have fine diameter (.0007" to .004") platinum alloy leads. The platinum leads are cut short and welded to insulated extension leads and the joints are covered in one of several insulation types depending upon the application or environment. The assembly is then ready for insertion into hypodermic needles, catheters or other small housings which require extended leads. Any of the Thermobeads or Thermoprobes listed in Table I may be used in a Series AB6 assembly. Please consult the catalog pages shown for specific electrical or mechanical properties for the thermistor selected.



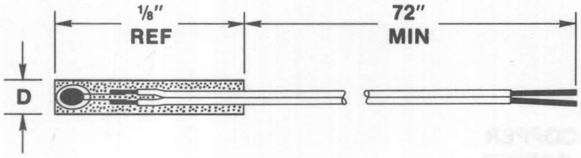
TYPE A INSULATION

AB6A8 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. LIQUID EPOXY RESIN WEB OVER WELD JOINTS PROVIDES SOME STRAIN RELIEF.

FOR INSERTION INTO PLASTIC TUBING OR OTHER INSULATORS.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 105° C.



TYPE B INSULATION

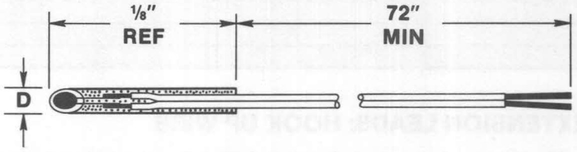
AB6B2 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. POLYIMIDE SLEEVE IS EPOXIED OVER WELD JOINTS AND THERMISTOR, FOR STRAIN RELIEF AND INSULATION.

FOR INSERTION INTO METAL HOUSINGS OR TUBINGS. BEAD COVERED FOR MAXIMUM STRAIN RELIEF AND PROTECTION.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 175° C.

APPLICATIONS:
Thermobead and Thermoprobe assemblies are used where the small thermistor must be further connected to longer leads, for insertion into deep wells and cavities, or threading into long tubes. They may also be used, as is, for applications which require fast response measurements in confined spaces. With these assemblies, the fast response of the small thermistor is available without sacrificing handleability. The added leads and insulation allows the minute assemblies to be handled in further assembly operations, such as insertion into catheter lumens. The same electical characteristics that apply to the selected thermistor: resistance value, resistance ratio, stability; are unaltered in the assembly.



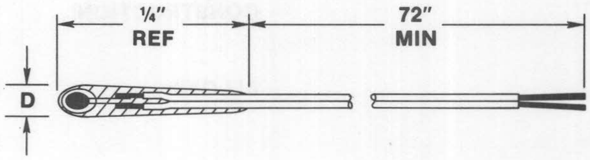
TYPE B INSULATION

AB6B4 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. POLIMIDE SLEEVE IS EPOXIED OVER WELD JOINTS AND UP TO BACK OF THERMISTOR BEAD, FOR STRAIN RELIEF AND ELECTRICAL INSULATION.

FOR INSERTION INTO METAL HOUSINGS OR TUBINGS WITH CLOSE TOLERANCES. BEAD EXPOSED AS MUCH AS POSSIBLE FOR FASTER RESPONSE.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 175° C.



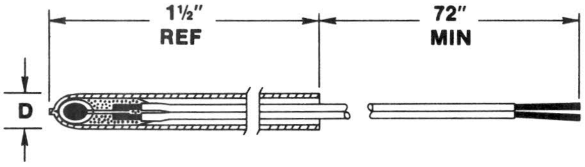
TYPE C INSULATION

AB6C8 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. MULTIPLE CONFORMAL DIP COATS OF LIQUID EPOXY RESIN FOR COMPLETE INSULATION WHEN IMMERSED IN FLUIDS.

FOR USE WHERE FASTEST RESPONSE TIMES ARE REQUIRED AND ASSEMBLY WILL BE FULLY IMMERSED IN CONDUCTIVE FLUIDS.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 105° C.



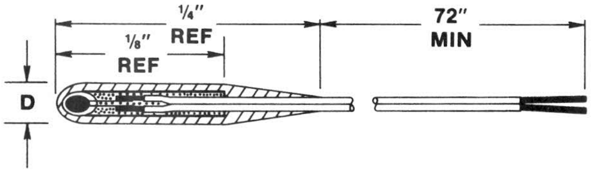
TYPE D INSULATION

AB6D2 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID EXTENSION LEADS, 6½ FT., ± ½ FT. LONG. SMALL WEB OF EPOXY PAINTED OVER WELD JOINTS FOR ELECTRICAL ISOLATION AND STRAIN RELIEF, HEAT SEALED MYLAR SHEATH OVER BEAD.

FOR FAST RESPONSE TIMES, LIMITED DEPTH OF IMMERSION, AND BEST LONG TERM IMMERSION QUALITIES.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 125° C.



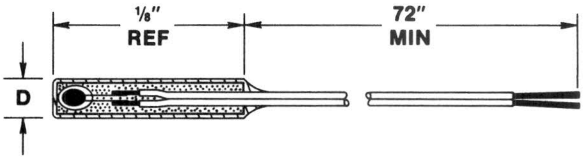
TYPE E INSULATION

AB6E3 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. POLIMIDE SLEEVE IS EPOXIED OVER WELDS FOR STRAIN RELIEF AND ELECTRICAL INSULATION, MULTIPLE CONFORMAL DIP COATINGS OF FORMVAR ENAMEL FOR COMPLETE IMMERSIBILITY IN CONDUCTIVE FLUIDS.

FOR USE IN APPLICATIONS WHERE FAST RESPONSE, GOOD STRAIN RELIEF AND FULL IMMERSION IS REQUIRED.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 105° C.



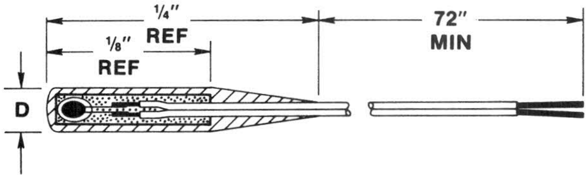
TYPE E INSULATION

AB6E5 -

THERMISTOR BEAD WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. POLYIMIDE SLEEVE IS EPOXIED OVER BEAD AND WELD JOINTS FOR STRAIN RELIEF AND INSULATION. LIQUID EPOXY RESIN CONFORMAL DIP COAT IS APPLIED FOR MOISTURE SEALING.

FOR USE WHERE ASSEMBLY WILL BE SUBJECTED TO LIMITED FLUID IMMERSIONS AND WHERE MAXIMUM STRAIN RELIEF IS ALSO REQUIRED WITH MINIMUM O.D.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 105° C.



TYPE E INSULATION

AB6E8 -

THERMISTOR WELDED TO 38 GA., NICKEL ALLOY 200, BIFILAR, HEAVY ISOMID INSULATED EXTENSION LEADS, 6½ FT. ± ½ FT. LONG. POLYIMIDE SLEEVE IS EPOXIED OVER WELDS AND THERMISTOR FOR STRAIN RELIEF AND ELECTRICAL INSULATION, MULTIPLE CONFORMAL DIP COATINGS OF LIQUID EPOXY RESIN FOR COMPLETE IMMERSIBILITY IN CONDUCTIVE FLUIDS.

FOR USE IN APPLICATIONS WHERE SUPERIOR STRAIN RELIEF AND FULL IMMERSION IS REQUIRED.

MAXIMUM CONTINUOUS OPERATING TEMPERATURE 105° C.

ORDERING INFORMATION:

1) Select the appropriate thermistor bead or small probe from one of the thermistor series shown in Table I. Refer to the appropriate catalog page for electrical and mechanical properties of the thermistor selected and specific ordering information for that thermistor.
2) Select one of the assembly styles shown and use the assembly prefix listed for that style followed by the thermistor part number.

example: AB6A8 - BR16KA103N

This assembly uses a .016" nominal diameter, ruggedized Thermobead (series BR16, page B7) with adjacent cut leads, 10 K ohms ± 25% at 25° C nominal resistance, welded to standard 6½ ± ½ foot long, 38 gauge, nickel alloy 200, bifilar, heavy isomid insulated extensions leads with epoxy resin web between the welded joints for strain relief.

SERIES AB6 - THERMOBEAD AND THERMOPROBE ASSEMBLIES.

TABLE I

STANDARD SIZES OF SERIES AB6 THERMISTOR ASSEMBLIES

THERMISTOR SERIES	CATALOG PAGE	MAXIMUM THERMISTOR DIAMETER	SMALLEST HOLE DIAMETER "D" INTO WHICH ASSEMBLY MAY BE INSERTED							
			A8	B2	B4	C8	D2	E3	E5	E8
B05	B-2	.0065	.013	.016	.014	.021	.033	.020	.019	.022
B07	B-2	.0085	.013	.016	.014	.021	.033	.020	.019	.022
B10	B-4	.0115	.013	.018	.014	.021	.033	.020	.022	.024
B14	B-4	.016	.016	.021	.016	.024	.036	.022	.025	.027
B35	B-6	.042	.042	.050	.042	.050	.062	.048	.054	.056
B43	B-6	.050	.050	.056	.050	.058	.070	.056	.060	.062
BR11	B-8	.012	.014	.018	.014	.022	.034	.020	.022	.024
BR14	B-10	.016	.016	.021	.016	.024	.036	.022	.025	.027
BR16	B-10	.017	.017	.022	.017	.025	.037	.023	.026	.028
BR23	B-12	.025	.025	.032	.025	.033	.045	.031	.036	.038
BR32	B-14	.033	.033	.040	.033	.041	.053	.039	.044	.046
BR42	B-16	.046	.046	.053	.046	.054	.066	.052	.057	.059
BR55	B-18	.060	.060	.070	.060	.068	.080	.066	.074	.076
P20	C-1	.020	.020	.026	.020	.028	.040	.026	.030	.032
P25	C-1	.025	.025	.031	.025	.033	.045	.031	.035	.037
P30	C-3	.030	.030	.036	.030	.038	.050	.036	.040	.042

NOTE: ALL DIMENSIONS ARE IN INCHES.

SPECIAL ORDERING INFORMATION:

The assembly styles shown represent the most standard selections of the many combinations of thermistors and materials which THM manufactures. These selected styles are suitable for many applications, however, there are always special requirements which need to be satisfied for some applications. A partial listing of alternate materials and options is given below to assist the designer for applications in which the standard units shown are not suitable. If assistance is required in the selection of materials or design of the assembly, please contact our Applications Engineering Department and detail the exact requirements or specifications desired.

OPTIONS: The standard units may be modified to suit the users particular needs by specifying any of the following options.

- Non-standard resistance values
- Reference temperature other than 25° C
- Non-standard tolerances (at one or more temperatures)
- Longer or shorter extension leads
- Special mountings or enclosures
- Special wire terminations and mountings
- Calibration - specify calibration schedule (see pg. 13, Table 4) and temperatures.
- Interchangeable pairs, sets; curve matching - specify temperatues and tolerances.

ALTERNATE MATERIALS SELECTION: The alternate materials listed are available for series AB6 thermistor assembly orders. Other materials may be available to the designer or user upon special order. Please allow additional time for the completion of special assembly orders.

TYPE A INSULATIONS - A web of insulating material is put over the weld joints for strain relief. Available insulating materials with maximum temperature ratings;

VINYL	(60° C)
POLYURETHANE	(105° C)
FORMVAR ENAMEL	(105° C)
SILICONE RUBBER	(260° C)
EPOXIES	(FROM 105° C to 260° C) - specify max temperature required.

TYPE B INSULATIONS - A polyimide sleeve is epoxied over the weld joints for improved strain relief and electrical insulation. The bead may be covered for maximum strain relief or exposed for faster response. Epoxies are generally used to fill the polyimide sleeve and have temperature ratings from 105° C to 260° C.

TYPE C INSULATIONS - Multiple conformal dip coats over the thermistor and welds are used in order to provide fully immersible assemblies. Any of the Type A insulating materials may be used for the conformal dip coatings depending upon the application or environment.

TYPE D INSULATIONS - A thermoplastic tubing is heat sealed over the bead or probe thermistor. A small amount of insulating material is applied over the weld joints for electrical isolation. The assembly is not fully immersible over the back end of the tubing. Available heat sealed tubing materials with maximum temperature ratings:

POLYETHYLENE	(80° C)
MYLAR	(125° C)

TYPE E INSULATIONS - A polyimide sleeve is epoxied over the weld joints (as in the type B insulations) and then multiple conformal dip coatings are applied (as in the type C insulations) for fully immersible assemblies. The same insulating material options are available.

INSULATED EXTENSION LEADS - The standard insulted extension lead sub assembly would have 38 gauge (.004" dia.), nickel alloy 200, bifilar, heavy isomid insulation over conductors and a length of 6½ ± ½ feet. The various options available are listed below. Unless otherwise specified parameters listed in boldface type are used. Other options, including any specified by the customer, are available upon special order.

WIRE GAUGES

#38 GA (.004"), #40GA (.0031")

CONDUCTORS

NICKEL ALLOY 200, nickel alloy 270

INSULATION

HEAVY ISOMID for use to 180° C, excellent abrasion resistance, our standard coating.

POLYURETHANE - for use to 105° C, easily stripped, exellent solderability.

POLYIMIDE - for use to 230° C, excellent thermal and dielectric properties, (not recommended for water and certain othe conductive fluids)

CONSTRUCTION

BIFILAR parallel conductors, our standard

SINGLE - individually insulated lead wires
TWISTED PAIR - 0.1 inch lay typical

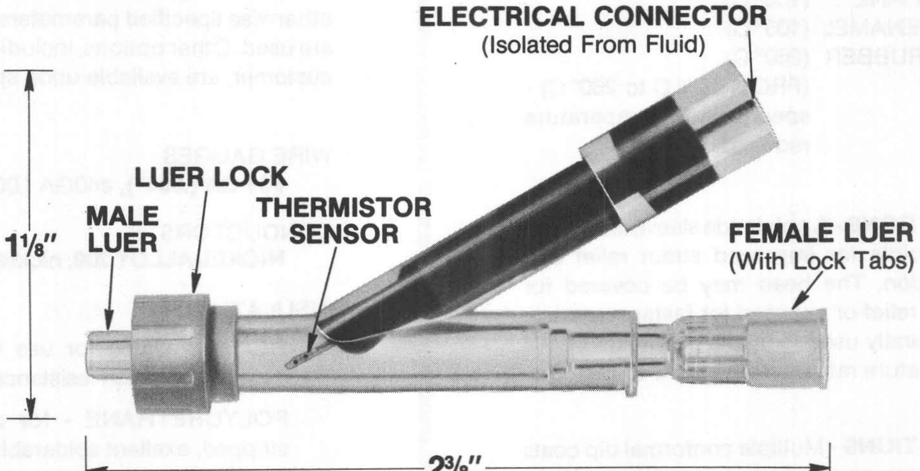
LENGTH

6½ ± ½ feet is standard, specify other lengths as desired. All lengths over one foot are supplied on a plastic bobbin with the wires wrapped so that the thermistor end is removed last.

ASSEMBLIES

A919a Fluid Temperature Sensor

FAST RESPONSE FLUID TEMPERATURE SENSOR for Laboratory, Medical Research & Industrial Use



Thermometrics, Inc., is the leading manufacturer of thermodilution thermistors and thermistor assemblies; and so is eminently qualified to introduce this major innovation in the temperature measurement of fluid streams:

the A919a
"Y" FLUID TEMPERATURE SENSOR

Ultrastable and very sensitive to even small temperature changes, the A919a enables the user to obtain rapid, accurate and repeatable temperature measurements in moving or static streams without contaminating the stream or interfering with the flow. The standard sensor is suitable for use in the laboratory, test situations and disposable medical research products. The ruggedized version, the A919b is well suited for industrial applications. Refer to Bulletin A919b for further details about the ruggedized A919b.

Design:
Unitherm Thermistor Sensors enclosed in heat sealed plastic are encapsulated into a plastic luer to form a leakproof unit composed of inert, non-contaminating materials which are compatible with approved FDA materials. An electrical connector is molded in for convenient electrical hook-up on laboratory bridges or voltage divider circuits (depending on application). The sensor may be ethelyne oxide sterilized. The A919a "Y" Fluid Temperature Sensor is a small, high volume, low cost unit. The size is approximately 2⅜ inches long and 1⅛ inch high. When used in an intravenous or similiar line it can be installed as rapidly as a hypodermic needle.

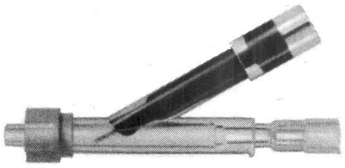
Temperature versus Thermistor Resistance for Standard A919 Sensors

Deg. C.	Resistance in Ohms	Deg. C.	Resistance in Ohms	Deg. C.	Resistance in Ohms	Deg. C.	Resistance in Ohms
0.00	56341.02	12.50	32931.96	25.00	20000.00	37.50	12579.79
0.50	55100.98	13.00	32258.53	25.50	19619.70	38.00	12357.11
1.00	53891.82	13.50	31600.79	26.00	19247.70	38.50	12139.00
1.50	52712.66	14.00	30958.34	26.50	18883.81	39.00	11925.35
2.00	51562.71	14.50	30330.79	27.00	18527.82	39.50	11716.05
2.50	50441.16	15.00	29717.76	27.50	18179.56	40.00	11511.00
3.00	49347.23	15.50	29118.86	28.00	17838.82	40.50	11310.12
3.50	48280.17	16.00	28533.75	28.50	17505.43	41.00	11113.29
4.00	47239.27	16.50	27962.07	29.00	17179.21	41.50	10920.44
4.50	46223.79	17.00	27403.47	29.50	16859.98	42.00	10731.47
5.00	45233.07	17.50	26857.63	30.00	16547.59	42.50	10546.29
5.50	44266.43	18.00	26324.21	30.50	16241.87	43.00	10364.82
6.00	43323.24	18.50	25802.91	31.00	15942.65	43.50	10186.97
6.50	42402.85	19.00	25293.41	31.50	15649.79	44.00	10012.67
7.00	41504.66	19.50	24795.43	32.00	15363.13	44.50	9841.83
7.50	40628.07	20.00	24308.67	32.50	15082.52	45.00	9674.38
8.00	39772.52	20.50	23832.85	33.00	14807.83	45.50	9510.24
8.50	38937.45	21.00	23367.70	33.50	14538.91	46.00	9349.34
9.00	38122.30	21.50	22912.94	34.00	14275.62	46.50	9191.60
9.50	37326.56	22.00	22468.33	34.50	14017.84	47.00	9036.95
10.00	36549.71	22.50	22033.61	35.00	13765.44	47.50	8885.34
10.50	35791.26	23.00	21608.53	35.50	13518.29	48.00	8736.68
11.00	35050.72	23.50	21192.86	36.00	13276.27	48.50	8590.92
11.50	34327.63	24.00	20786.37	36.50	13039.25	49.00	8447.99
12.00	33621.52	24.50	20388.82	37.00	12807.13	49.50	8307.83
						50.00	8170.38

Interchangeability ± 0.25°C from 0°C to 30°C

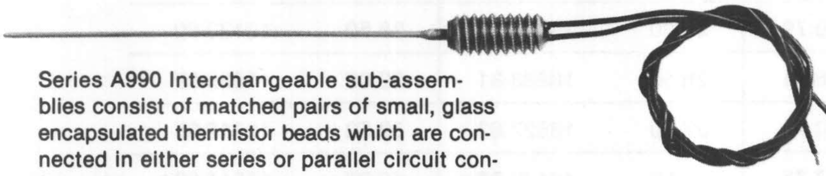
Options: the following modifications to the standard unit are possible, and should be discussed with our Applications Engineering Staff for price and availability.

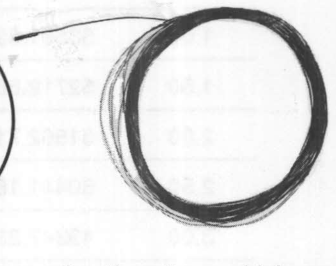
- Non-standard resistance values
- Non-standard tolerances (at one or more temperatures)
- Non-standard time constants
- Ruggedized version



INTERCHANGEABLE SUB-ASSEMBLIES

SERIES A990





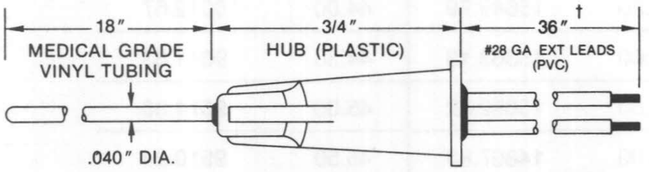
Series A990 Interchangeable sub-assemblies consist of matched pairs of small, glass encapsulated thermistor beads which are connected in either series or parallel circuit configurations. These sub-assemblies are available in a variety of styles which will permit them to be used in measuring the temperature of liquids or solids or to be encapsulated into larger housings such as hypodermic needles or closed end sheaths.

The sub-assemblies provide interchangeable resistance-temperature characteristics in extremely small, fast response packages which are easy to handle. The units shown are available from stock or with fast delivery. Resistance, tolerances and temperature ranges other than those which are indicated may be available upon special order. Other assembly configurations may be available upon special order. Please consult factory for any special requests or modifications.

Maximum Operating or Storage Temperature for Optimum Stability is 105°C.

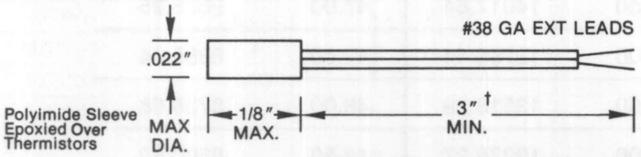
Series A990 Interchangeable Sub-Assemblies

A990P********



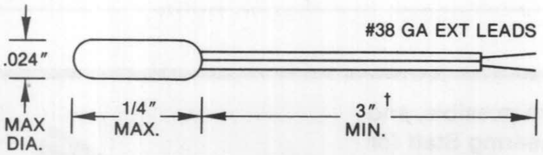
	STILL AIR	WATER PLUNGE		STILL AIR	STILL WATER
T.C.	6.0 SEC.	.3 SEC.	D.C.	.6 mW/°C	1.2 mW/°C

A990B********



	STILL AIR	WATER PLUNGE
T.C.	1.5 SEC.	.150 SEC.
	STILL AIR	**STILL WATER**
D.C.	.36 mW/°C	1.0 mW/°C

A990C********

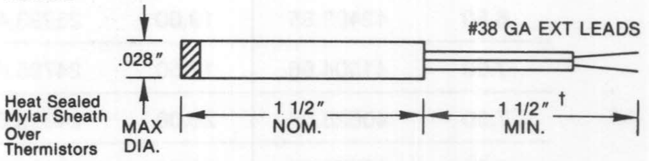


Conformal Coating Over Thermistors

	STILL AIR	WATER PLUNGE
T.C.	1.5 SEC.	.150 SEC.
	STILL AIR	**STILL WATER**
D.C.	.40 mW/°C	1.1 mW/°C

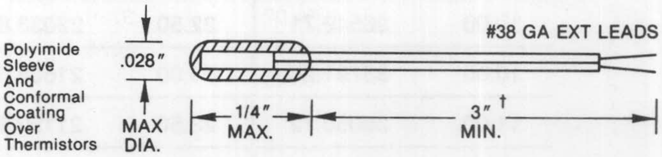
†LONGER LEADS ARE AVAILABLE ON REQUEST

A990D********



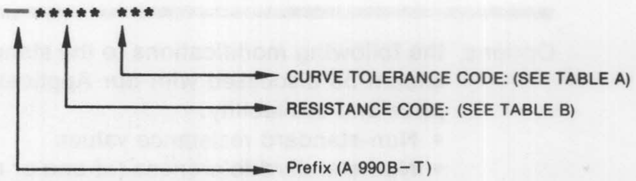
	STILL AIR	WATER PLUNGE
T.C.	2.0 SEC.	.200 SEC.
	STILL AIR	**STILL WATER**
D.C.	.50 mW/°C	1.2 mW/°C

A990E********



	STILL AIR	WATER PLUNGE
T.C.	2.0 SEC.	.200 SEC.
	STILL AIR	**STILL WATER**
D.C.	.40 mW/°C	1.1 mW/°C

ORDERING INFORMATION

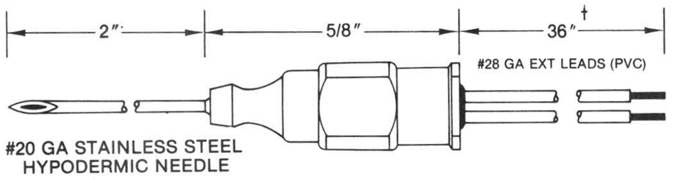


CURVE TOLERANCE CODE: (SEE TABLE A)
RESISTANCE CODE: (SEE TABLE B)
Prefix (A 990B−T)

T.C. = THERMAL TIME CONSTANT
D.C. = DISSIPATION CONSTANT

A990M *********

HYPODERMIC NEEDLE ASSEMBLY

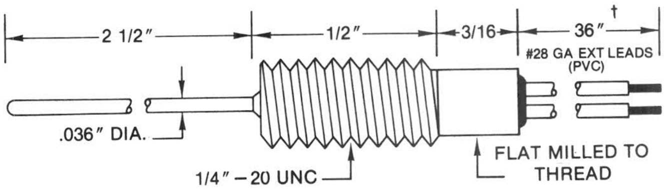


T.C.	STILL AIR 15 SEC.	WATER PLUNGE .250 SEC.
D.C.	STILL AIR .80 mW/°C	STILL WATER 1.7 mW/°C

T.C. = THERMAL TIME CONSTANT
D.C. = DISSIPATION CONSTANT

A990T *********

STAINLESS STEEL SHEATH WITH THREADED HUB



T.C.	STILL AIR 16 SEC.	WATER PLUNGE .300 SEC.
D.C.	STILL AIR .80 mW/°C	STILL WATER 1.8 mW/°C

†LONGER LEADS ARE AVAILABLE ON REQUEST

TABLE A: CURVE TOLERANCES

	TEMPERATURE TOLERANCE IN °C (±)			
TOL. CODE	0°C-25°C	25°C-50°C	50°C-70°C	70°C-105°C
Sx1	.1	.05	.1	.2
Sx2	.1	.1	.1	.2
Sx3	.2	.1	.2	.3
Sx4	.2	.2	.2	.3

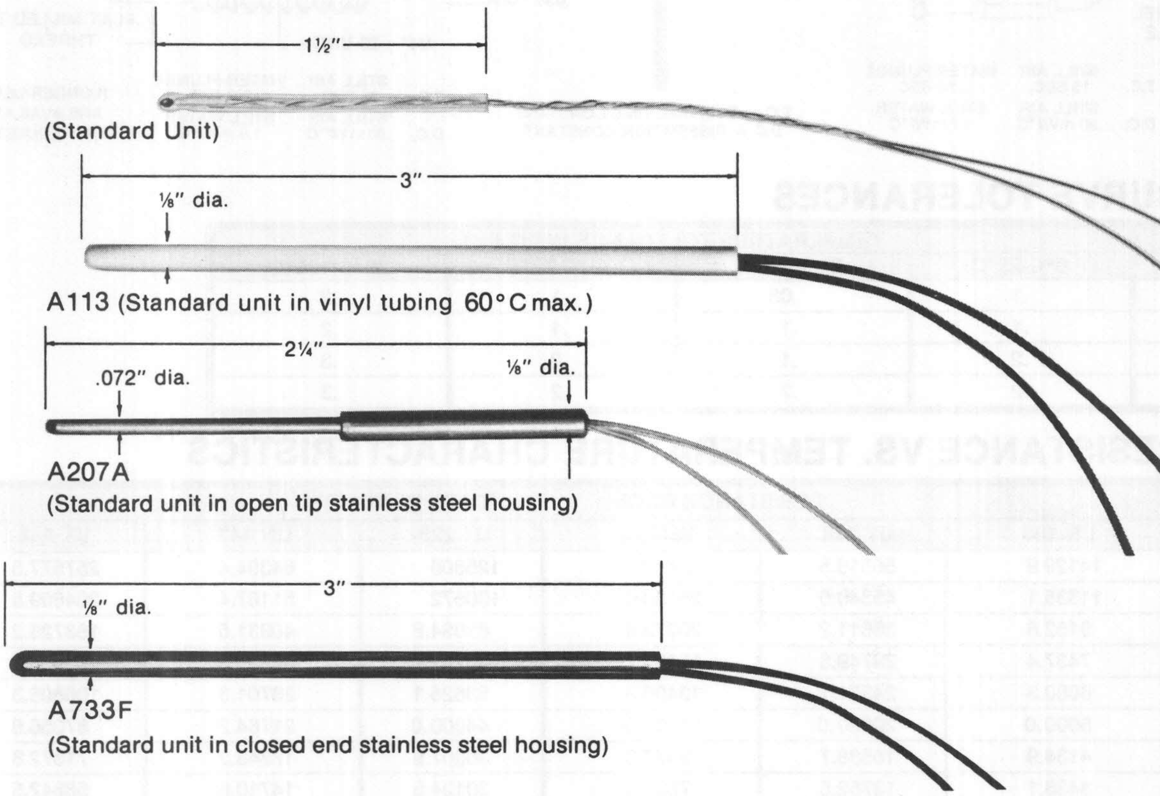
TABLE B: RESISTANCE VS. TEMPERATURE CHARACTERISTICS

TEMP (°C)	RESISTANCE CODE (DATA IN OHMS)					
	UN 103	UT 103	UN 223	UT 223	UN 443	UT 443
0	14129.9	56519.5	31452.1	125808	64394.4	257577.5
5	11335.1	45340.5	25168.0	100672	51167.4	204669.5
10	9152.8	36611.2	20273.6	81094.6	40931.5	163726.2
15	7437.4	29749.5	16435.7	65742.7	32956.3	131825.2
20	6080.3	24321.1	13406.3	53625.1	26701.3	106805.3
25	5000.0	20000.0	11000 0	44000.0	21764.2	87056.8
30	4134.9	16539.7	9077.0	36307.9	17843.2	71372.8
35	3438.1	13752.5	7531.1	30124.5	14710.6	58842.5
40	2873.8	11495.1	6281.4	25125.7	12193.5	48774.1
45	2414.2	9656.7	5265.6	21062.5	10159.7	40638.8
50	2038.0	8151.9	4435.6	17742.3	8507.6	34030.3
55	1728.4	6913.8	3753.9	15015.5	7154.4	28617.7
60	1472.6	5890.2	3191.3	12765.2	6043.0	24171.9
65	1260.0	5040.0	2724.8	10899.2	5126.1	20504.4
70	1082.7	4330.6	2336.2	9344.9	4366.4	17465.8
75	934.02	3736.1	2011.1	8044.5	3734.4	14937.8
80	808.93	3235.7	1738.0	6952.0	3206.5	12825.9
85	703.23	2812.9	1507.6	6030.3	2763.7	11054.7
90	613.55	2454.2	1312.4	5249.6	2390.8	9563.4
95	537.18	2148.7	1146.5	4586.0	2075.7	8303.0
100	471.90	1887.6	1004.9	4019.6	1808.5	7233.9
105	415.90	1663.6	883.67	3534.7	1580.9	6323.7

APPLICATIONS:
A990B — For insertion into metal housing or close tolerance openings.
A990C — Fully immersible sub-assembly for use in conductive fluids.
A990D — Limited depth immersion or surface contact.
A990E — Fully immersible sub-assembly with additional mechanical strain relief.
A990M — Sub-assembly encapsulated into sharpened hypodermic needle with 3 foot extension leads of #28 GA PVC wire. For various laboratory temperature measurements.
A990P — Standard sub-assembly encapsulated into vinyl catheter tubing with #28 GA PVC wire extension leads.
A990T — Sub-assembly encapsulated into closed end stainless steel sheath with threaded hub. For various commercial applications or severe environments.

TEMPERATURE STANDARDS SERIES CSP

Ultrastable
Calibrated
Low Cost



(Standard Unit)

A113 (Standard unit in vinyl tubing 60°C max.)

A207A
(Standard unit in open tip stainless steel housing)

A733F
(Standard unit in closed end stainless steel housing)

The Series CSP Temperature Standards are ultrastable probe thermistors which have been calibrated to an accuracy of 0.01°C. The standard unit has a thin, conformal coating of silicone rubber over the entire unit; this makes it suitable for immersion in a water bath. They are also available with stainless steel sensor housings, or they can be encapsulated into various sheaths. See assemblies depicted above.

Two types of Series CSP Thermoprobes are stocked for quick delivery: the CSP60BA252M with a nominal resistance of 2500 ohms @25°C; it is furnished with calibration over the range of 0 to 50°C. The CSP60BT103M has a nominal resistance of 10K ohms @25°C and is furnished with calibration over the range of 0 to 100°C. The calibration table normally furnished with the CSP60BA252M provides data every 0.25°C between 0 and 50°C. The table furnished with the CSP60BT103M provides data every 0.5°C over the range of 0 to 100°C. Both units are furnished with interpolation equations which are accurate to 0.01°C. Tables with calibration data furnished every 0.01, 0.05 or 0.1°C are also available.

All units can be supplied with calibrations over different temperature ranges, with longer leads; and with various coatings. Please contact our Applications Engineering staff for details.

Nominal Curve for CSP60BA252M

Temperature °C	Resistance Ratio R_T/R_{25}	Temperature °C	Resistance Ratio R_T/R_{25}
0.00	2.84438	30.00	0.82461
5.00	2.28160	35.00	0.68340
10.00	1.84096	40.00	0.56913
15.00	1.49390	45.00	0.47620
20.00	1.21899	50.00	0.40025
25.00	1.00000		

Temperature Standards — Series CSP

Nominal Curve for CSP60BT103M

Temperature °C	Resistance Ratio R_T/R_{25}	Temperature °C	Resistance Ratio R_T/R_{25}
0.00	2.94227	65.00	0.23773
5.00	2.33994	70.00	0.20279
10.00	1.87383	75.00	0.17368
15.00	1.51049	80.00	0.14932
20.00	1.22532	85.00	0.12886
25.00	1.00000	90.00	0.11159
30.00	0.82084	95.00	0.09697
35.00	0.67752	100.00	0.08455
40.00	0.56219		
45.00	0.46887		
50.00	0.39295		
55.00	0.33087		
60.00	0.27985		

PRICING

Ordering Code	Description
CSP60BA252M	Nominal resistance 2500 ohms @ 25°C, calibration table every 0.25°C between 0 and 50°C
CSP60BT103M	Nominal resistance 10K ohms @ 25°C, calibration table every 0.5°C between 0 and 100°C

OPTIONS:

A113 - * — Plastic tubing 60 ° C max.

A207A - * — Open tip stainless steel housing

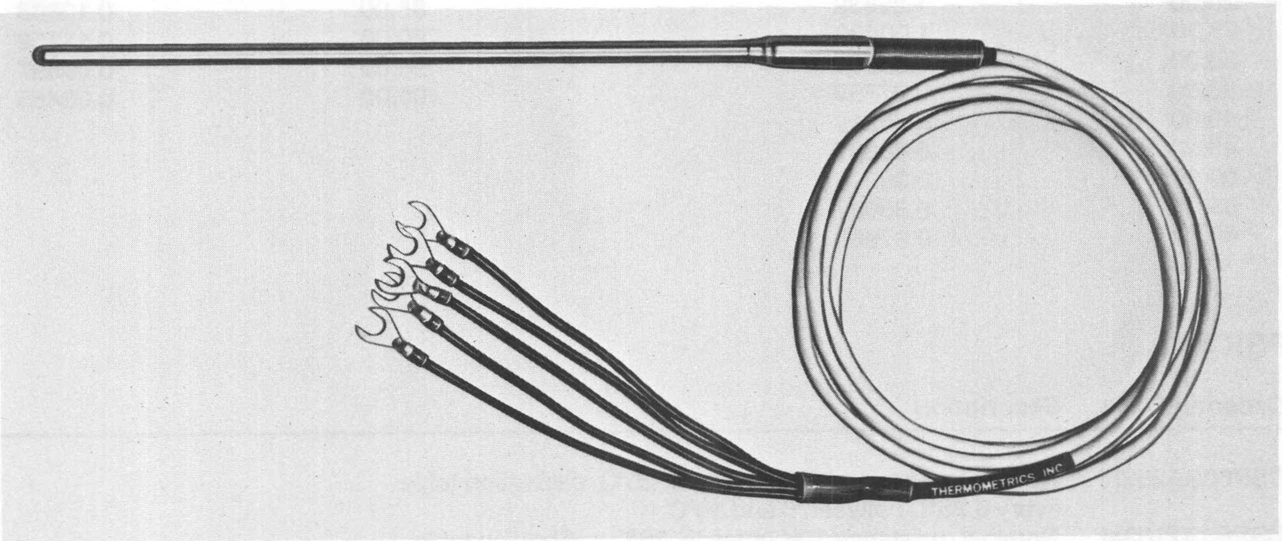
A733F - * — Closed end stainless steel housing

- * CSP60BA252M or CSP60BT103M

OTHER CALIBRATION TABLES ARE AVAILABLE AT ADDITIONAL COST
CONSULT FACTORY FOR DETAILS

TEMPERATURE STANDARDS SERIES "S", "AS", "ES"

STYLE: Thermometrics temperature standards consist of ultra-stable thermistor probes assembled into thin wall stainless steel housings with shielded extension leads. The thermistors used receive special processing to ensure long term stability. All THM thermistor temperature standards are ruggedly constructed and are suitable for liquid immersion.



CONFIGURATION: THM temperature standards are enclosed in thin-wall stainless tubes, welded closed at one end. The shielded cable is encapsulated into the tube to provide a solid moisture-proof seal. Full immersion of the metal portion of the standard is permissible. The calibration data is given for an immersion depth of 8" on 9" housings, and 4" on 4½" long housings.

TEMPERATURE RANGE: The "S" series and "AS" series are designed for operation over the range of 0° C to 60° C. The "ES" series is rated for 0° C to 100° C.

STABILITY: The stability of each THM temperature standard is guaranteed for a period of one year. When properly used, the following stability ratings apply:

"AS" series: 0.002° C/yr
"S" series: 0.005° C/yr
"ES" series: 0.005° C/yr

RESISTANCE VS. TEMPERATURE CHARACTERISTIC: The nominal resistance values are shown below:

SERIES	RESISTANCE IN OHMS			
	0° C	25° C	60° C	100° C
"AS" & "S"	14250	5000	1458	
"AS" & "S"	11400	4000	1166	
"ES"	28500	10000	2915	925

CALIBRATION: Precision calibration, traceable to the National Bureau of Standards, is provided for all THM temperature standards. A computer generated table in increments of 0.01° C is furnished with each calibration based on the interpolation formula, $R_T = \exp(A_o + A_1/T + A_2/T^2 + A_3/T^3)$. The constants for the formula are obtained from a polynomial regression performed on the calibration data obtained. Over the range of 0° C to 60° C, calibration is performed at the triple point of water (0.01° C) and 15° C, 25° C, 30° C, 37° C, 50° C, and 60° C. For the range of 0° C to 100° C, calibrations are performed at the triple point of water, 25° C, 30° C, 37° C, 60° C, 80° C, and 100° C. Two-wire calibrations are performed using a Wheatstone Bridge calibrated to an accuracy of better than 0.005%. Four-wire calibrations are based on a comparison technique using a ratio bridge having an accuracy of 0.0002%. All resistance measurements are referenced to standard resistors calibrated by NBS. All temperature measurements are made using a standard platinum resistance thermometer which has been calibrated by NBS.

ACCURACY: The calibration accuracies of THM Temperature Standards (at-time of sale) are as follows:

SERIES	ACCURACY	
	0° C-60° C	60° C-100° C
"AS"	0.001° C	
"S"	0.0015° C	
"ES"	0.0015° C	0.0025° C

The uncertainties of the computer tables are 0.001° C for the series "AS" and 0.003° C for the series "S" and "ES".

READ-OUT DEVICES: Any suitable resistance measuring instrument may be used with THM TEMPERATURE STANDARDS. Care must be taken, however, to avoid excessive self-heating of the thermistor. A power dissipation of 4 microwatts will result in 0.001° C self-heat. Self-heat error can be minimized by duplicating the conditions of calibration which are provided with each THM certificate of calibration.

APPLICATIONS: THM thermistor standards are rugged, precision sensors suitable for use as secondary or working temperature standards for all laboratory metrology applications. They generally are not affected by shock and vibration and, consequently, are also suitable for field use. THM temperature standards fill the need for low cost temperature standards for general laboratory and hospital use, clinical applications and process temperature measurements. Special versions are available for military and space use. Standards are also available for other temperature ranges in a variety of sizes and enclosures. Our Applications Engineering Staff can assist you with your specific requirements.

AVAILABLE MODELS

THREE DIFFERENT SERIES ARE AVAILABLE EACH IN FOUR DIFFERENT SIZES TO ACCOMMODATE ALL STANDARD REQUIREMENTS:

SERIES "S" which includes S10, S15, S20, S25 offer standard 0.005° C/yr stability and temperature range 0° to 60° C.

SERIES "AS" which includes AS110, AS115, AS120, AS125 offer 0.002° C/yr stability and temperature range 0° to 60° C.

SERIES "ES" which includes ES210, ES215, ES220, ES225 offer 0.005° C/yr stability and temperature range 0° to 100° C.

DIMENSIONS AND SUMMARY INFORMATION

Dimensions in Inches ( ) Dia x ( ) Long	Standard Series "S"	Stability °C/Year	Absolute Series "AS"	Stability °C/Year	Temp. Range for "S" & "AS" °C	Extended Temp. Range	Stability °/Year °C	Temp. Range "ES" °C
1/4" x 9"	S10	0.005	AS110	0.002	0-60	ES210	0.005	0-100
1/8" x 4 1/2"	S15	0.005	AS115	0.002	0-60	ES215	0.005	0-100
1/4" x 4 1/2"	S20	0.005	AS120	0.002	0-60	ES220	0.005	0-100
1/8" x 9"	S25	0.005	AS125	0.002	0-60	ES225	0.005	0-100

ORDERING INFORMATION All temperature standards series "S", "AS" & "ES" may be ordered by part number and are availble in two-wire and four-wire terminations. Unless otherwise specified a two-wire termination will be supplied. If a four-wire termination is desired specify by adding the suffix "4 wire". Therefore an ES220 unit in 4-wire is ordered as "ES220-4 wire".

RESISTANCE RATIO VS. TEMPERATURE

To find the Thermistor Resistance at any specified temperature, multiply the Resistance Ratio given by the Resistance at 25° C.

TABLE NO.		1	2	3	4	5	6	7	8
BETA: 25-125° C (KELVIN)		2930	2997	3133	3359	3548	3672	3708	4015
RATIO: 25° C/125° C		11.80	12.48	14.01	16.94	19.86	22.06	22.73	29.43
RATIO: 0° C/50° C		5.177	5.344	5.658	6.362	7.038	7.438	7.583	9.115
TC: α25° C (%/° C)		-3.27	-3.33	-3.44	-3.67	-3.88	-3.98	-4.02	-4.39
°F	°C								
-112	-80	139.7	152.5	175.3	232.4				
-103	-75	101.6	109.5	125.1	164.4				
- 94	-70	74.52	79.51	90.27	117.4				
- 85	-65	55.15	58.40	65.87	84.64				
- 76	-60	41.19	43.36	48.58	61.59	76.05	87.56	91.62	143.2
- 67	-55	31.04	32.54	36.19	45.25	54.97	62.37	65.05	98.02
- 58	-50	23.61	24.66	27.24	33.55	40.15	44.97	46.74	68.03
- 49	-45	18.12	18.87	20.70	25.11	29.62	32.79	33.97	47.83
- 40	-40	14.03	14.58	15.87	18.97	22.06	24.16	24.96	34.04
- 31	-35	10.95	11.36	12.28	14.45	16.59	17.99	18.53	24.52
- 22	-30	8.625	8.926	9.580	11.10	12.59	13.53	13.89	17.86
- 13	-25	6.848	7.071	7.536	8.604	9.632	10.27	10.51	13.14
- 4	-20	5.479	5.645	5.974	6.721	7.433	7.863	8.025	9.772
+ 5	-15	4.418	4.540	4.772	5.291	5.783	6.072	6.181	7.337
14	-10	3.589	3.677	3.839	4.197	4.534	4.728	4.800	5.559
23	- 5	2.935	2.998	3.110	3.353	3.581	3.709	3.757	4.250
32	0	2.418	2.460	2.536	2.698	2.849	2.932	2.962	3.276
41	5	2.004	2.032	2.081	2.185	2.282	2.334	2.353	2.546
50	10	1.672	1.688	1.718	1.781	1.840	1.870	1.881	1.994
59	15	1.403	1.410	1.427	1.461	1.493	1.509	1.515	1.573
68	20	1.185	1.184	1.192	1.206	1.218	1.224	1.227	1.250
77	25	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
86	30	.8572	.8494	.8440	.8344	.8262	.8215	.8197	.8051
95	35	.7338	.7239	.7155	.6994	.6860	.6785	.6757	.6524
104	40	.6295	.6197	.6094	.5892	.5725	.5633	.5600	.5318
113	45	.5414	.5329	.5215	.4987	.4802	.4701	.4665	.4360
122	50	.4671	.4603	.4482	.4241	.4048	.3942	.3906	.3594
131	55	.4044	.3993	.3869	.3623	.3428	.3321	.3285	.2979
140	60	.3515	.3479	.3353	.3108	.2917	.2811	.2776	.2481
149	65	.3068	.3042	.2917	.2677	.2492	.2390	.2356	.2077
158	70	.2689	.2671	.2548	.2316	.2138	.2040	.2008	.1747
167	75	.2367	.2355	.2234	.2011	.1842	.1748	.1719	.1476
176	80	.2093	.2083	.1965	.1753	.1593	.1504	.1477	.1253
185	85	.1859	.1849	.1735	.1533	.1383	.1299	.1274	.1067
194	90	.1659	.1648	.1536	.1346	.1205	.1126	.1102	.09134
203	95	.1487	.1473	.1365	.1185	.1054	.09794	.09575	.07846
212	100	.1339	.1321	.1217	.1048	.09245	.08547	.08346	.06766
221	105	.1212	.1188	.1088	.09285	.08138	.07484	.07298	.05856
230	110	.1101	.1072	.09750	.08256	.07186	.06573	.06402	.05085
239	115	.1005	.09700	.08764	.07362	.06364	.05791	.05633	.04432
248	120	.09208	.08802	.07900	.06583	.05654	.05117	.04971	.03875
257	125	.08475	.08010	.07139	.05903	.05036	.04534	.04400	.03398
266	130	.07832	.07308	.06467	.05307	.04487	.04029	.03905	.02990
275	135	.07267	.06684	.05873	.04784	.04023	.03589	.03475	.02638
284	140	.06769	.06129	.05345	.04323	.03619	.03209	.03100	.02334
293	145	.06330	.05633	.04876	.03915	.03264	.02872	.02772	.02071
302	150	.05940	.05189	.04458	.03555	.02953	.02577	.02485	.01843
311	155	.05595	.04791	.04085	.03234	.02680	.02318	.02233	.01644
320	160	.05288	.04433	.03750	.02949	.02438	.02090	.02011	.01470
329	165					.02224	.01887	.01815	.01318
338	170					.02033	.01708	.01642	.01184
347	175					.01864	.01550	.01489	.01066
356	180					.01713	.01409	.01353	.009623
365	185					.01577	.01283	.01231	.008703
374	190					.01456	.01171	.01123	.007888
383	195					.01347	.01071	.01027	.007164
392	200					.01248	.009811	.009401	.006519
401	205					.01159	.009004	.008624	.005943
410	210					.01079	.008278	.007925	.005428
419	215					.01006	.007624	.007295	.004966
428	220					.009395	.007033	.006727	.004552
437	225					.008790	.006499	.006214	.004179
446	230					.008239	.006014	.005749	.003843
455	235					.007735	.005575	.005326	.003539
464	240					.007274	.005175	.004943	.003265
473	245					.006850	.004811	.004594	.003016
482	250					.006462	.004479	.004275	.002791
491	255					.006104	.004176	.003985	.002586
500	260					.005774	.003899	.003719	.002399

NOTES:

1. Table values do not take into account leadwire resistance values which can have a significant effect on ratio values obtained when using low resistance devices. This is particularly true at high temperatures.
2. These tables are plotted as curves on the inside back cover. The plotted curves facilitate interpolation between the temperature points given in the tables.

RESISTANCE RATIO VS. TEMPERATURE

To find the Thermistor Resistance at any specified temperature, multiply the Resistance Ratio given by the Resistance at 25° C.

9 4069 30.80 9.355 -4.44	10 4125 32.39 9.598 -4.49	11 4243 35.68 10.11 -4.59	12 4320 38.05 10.43 -4.66	13 4520 45.05 11.44 -4.84	14 4598 48.10 11.88 -4.91	15 4790 56.53 13.19 -5.12	16 5135 75.64 15.60 -5.46	TABLE NO. BETA: 25-125° C (KELVIN) RATIO: 25° C/125° C RATIO: 0° C/50° C TC: α 25° C (%/° C) ° F	° C
								-112	-80
								-103	-75
								- 94	-70
								- 85	-65
151.1	157.1	165.9	176.2	202.0	212.5	223.1	349.5	- 76	-60
103.1	107.0	114.1	119.7	136.7	143.7	155.2	228.4	- 67	-55
71.27	73.88	79.22	82.32	93.51	98.20	108.1	151.1	- 58	-50
49.94	51.66	55.52	57.30	64.71	67.83	75.55	101.2	- 49	-45
35.42	36.57	39.27	40.34	45.26	47.34	53.04	68.51	- 40	-40
25.42	26.19	28.05	28.72	31.99	33.37	37.44	46.89	- 31	-35
18.45	18.97	20.23	20.67	22.84	23.76	26.58	32.43	- 22	-30
13.53	13.88	14.73	15.03	16.47	17.08	19.00	22.65	- 13	-25
10.03	10.26	10.82	11.03	11.99	12.39	13.68	15.97	- 4	-20
7.507	7.663	8.029	8.175	8.806	9.072	9.924	11.37	+ 5	-15
5.671	5.774	6.010	6.114	6.526	6.700	7.252	8.161	14	-10
4.322	4.390	4.538	4.612	4.878	4.989	5.340	5.910	23	- 5
3.322	3.364	3.452	3.508	3.676	3.746	3.963	4.315	32	0
2.574	2.600	2.654	2.689	2.792	2.835	2.964	3.175	41	5
2.010	2.027	2.056	2.078	2.137	2.161	2.233	2.355	50	10
1.582	1.591	1.605	1.617	1.647	1.661	1.696	1.759	59	15
1.253	1.258	1.262	1.268	1.279	1.284	1.297	1.323	68	20
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	77	25
.8033	.8017	.7963	.7946	.7872	.7844	.7756	.7638	86	30
.6493	.6462	.6387	.6352	.6235	.6190	.6066	.5868	95	35
.5280	.5240	.5153	.5109	.4969	.4915	.4771	.4537	104	40
.4318	.4274	.4183	.4133	.3984	.3926	.3775	.3531	113	45
.3551	.3505	.3414	.3362	.3212	.3154	.3005	.2766	122	50
.2936	.2890	.2801	.2749	.2603	.2547	.2405	.2179	131	55
.2440	.2396	.2311	.2260	.2122	.2069	.1936	.1727	140	60
.2038	.1996	.1916	.1868	.1738	.1689	.1567	.1376	149	65
.1710	.1670	.1596	.1550	.1430	.1385	.1275	.1103	158	70
.1442	.1405	.1335	.1293	.1183	.1142	.1042	.08884	167	75
.1221	.1186	.1122	.1083	.09826	.09453	.08559	.07193	176	80
.1038	.1006	.09774	.09115	.08199	.07863	.07064	.05854	185	85
.08862	.08572	.08031	.07701	.06870	.06568	.05857	.04786	194	90
.07596	.07331	.06835	.06533	.05781	.05509	.04877	.03932	203	95
.06535	.06294	.05839	.05563	.04883	.04640	.04079	.03245	212	100
.05644	.05424	.05008	.04755	.04141	.03923	.03425	.02689	221	105
.04891	.04691	.04309	.04079	.03525	.03329	.02887	.02238	230	110
.04253	.04071	.03722	.03511	.03011	.02836	.02443	.01871	239	115
.03710	.03545	.03225	.03033	.02581	.02424	.02075	.01570	248	120
.03247	.03097	.02803	.02628	.02220	.02079	.01769	.01322	257	125
.02851	.02714	.02445	.02284	.01915	.01789	.01514	.01118	266	130
.02509	.02386	.02138	.01992	.01658	.01545	.01299	.009485	275	135
.02216	.02104	.01876	.01742	.01440	.01338	.01120	.008077	284	140
.01962	.01860	.01650	.01528	.01254	.01162	.009680	.006901	293	145
.01742	.01649	.01456	.01344	.01095	.01012	.008394	.005916	302	150
.01551	.01466	.01287	.01185	.009588	.008844	.007300	.005088	311	155
.01384	.01307	.01142	.01048	.008420	.007748	.006367	.004390	320	160
.01238	.01167	.01015	.009286	.007413	.006806	.005568	.003799	329	165
.01111	.01046	.009044	.008251	.006543	.005994	.004883	.003297	338	170
.009986	.009387	.008078	.007349	.005790	.005293	.004292	.002870	347	175
.008998	.008447	.007232	.006561	.005136	.004685	.003783	.002505	356	180
.008126	.007617	.006489	.005870	.004566	.004156	.003342	.002193	365	185
.007354	.006884	.005835	.005264	.004068	.003696	.002959	.001924	374	190
.006669	.006234	.005258	.004730	.003633	.003294	.002626	.001693	383	195
.006060	.005657	.004747	.004259	.003251	.002942	.002335	.001494	392	200
.005518	.005144	.004294	.003843	.002915	.002633	.002081	.001321	401	205
.005034	.004686	.003892	.003474	.002620	.002362	.001858	.001171	410	210
.004600	.004276	.003534	.003146	.002359	.002123	.001662	.001040	419	215
.004212	.003910	.003215	.002855	.002128	.001911	.001490	.0009259	428	220
.003864	.003581	.002930	.002595	.001923	.001724	.001338	.0008263	437	225
.003550	.003285	.002675	.002363	.001741	.001559	.001204	.0007389	446	230
.003267	.003019	.002446	.002155	.001579	.001411	.001085	.0006621	455	235
.003011	.002779	.002240	.001969	.001434	.001280	.0009796	.0005946	464	240
.002780	.002561	.002055	.001802	.001305	.001163	.0008858	.0005349	473	245
.002571	.002365	.001887	.001651	.001190	.001059	.0008023	.0004822	482	250
.002381	.002186	.001737	.001516	.001086	.0009649	.0007278	.0004355	491	255
.002208	.002024	.001600	.001393	.0009931	.0008810	.0006612	.0003940	500	260

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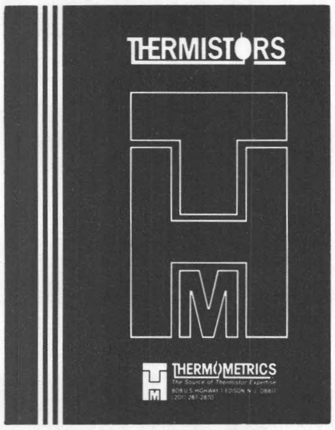
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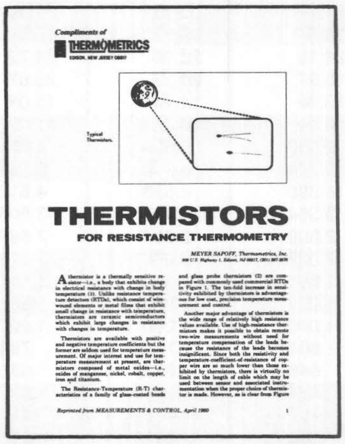
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THERMISTORS
FOR RESISTANCE THERMOMETRY

MEYER SAPOFF, Thermometrics, Inc.
808 U.S. Highway 1, Edison, NJ 08817, (201) 287-2870

A thermistor is a thermally sensitive resistor—i.e., a body that exhibits change in electrical resistance with change in body temperature (1). Unlike resistance temperature detectors (RTDs), which consist of wire-wound elements or metal films that exhibit small change in resistance with temperature, thermistors are ceramic semiconductors which exhibit large changes in resistance with changes in temperature.

Thermistors are available with positive and negative temperature coefficients but the former are seldom used for temperature measurement. Of major interest and use for temperature measurement at present, are thermistors composed of metal oxides—i.e., oxides of manganese, nickel, cobalt, copper, iron and titanium.

The Resistance-Temperature (R-T) characteristics of a family of glass-coated beads and glass probe thermistors (2) are compared with commonly used commercial RTDs in Figure 1. The ten-fold increase in sensitivity exhibited by thermistors is advantageous for low cost, precision temperature measurement and control.

Another major advantage of thermistors is the wide range of relatively high resistance values available. Use of high-resistance thermistors makes it possible to obtain remote two-wire measurements without need for temperature compensation of the leads because the resistance of the leads becomes insignificant. Since both the resistivity and temperature-coefficient-of-resistance of copper wire are so much lower than those exhibited by thermistors, there is virtually no limit on the length of cable which may be used between sensor and associated instrumentation when the proper choice of thermistor is made. However, as is clear from Figure

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THERMISTORS FOR
RESISTANCE THERMOMETRY
APPLICATION NOTE 211
(Reprinted from Measurements & Control)

INTERCHANGEABLE CHIP THERMISTORS FOR BIOMEDICAL APPLICATIONS

THERMOMETRICS

INTERCHANGEABLE CHIP
THERMISTORS FOR
BIOMEDICAL APPLICATIONS

NEW *physiological pressure sensor*

for Medical Research & Clinical Use Bulletin PPS-1

Thermometrics Inc. is a leading manufacturer of disposable electronic components and assemblies for the medical field. After many years in development THM has produced a small, accurate, low priced, dual function disposable pressure/temperature transducer suitable for laboratory, and biomedical use.

The present design offers a distal tip mount for attachment to a seven (7) french catheter tube. The sensitive silicone rubber diaphragm is at the front face, with the rear section serving as a shank to attach to the catheter. Three wire flexible insulated electrical conductors, six feet (6') long are provided for the manufacture of catheters of most lengths. The rear shank is tubular and acts as an atmospheric pressure reference.

The THM PPS-1 is a special configuration strain gauge that changes its electrical resistance as a function of pressure. It also contains an active element that changes its electrical resistance as a function of temperature. Either or both functions may be utilized when used with a THM electronic amplifier. The pressure signal is compatible with most AC or DC amplifiers. Resistors are matched to each sensor so that all sensors are both interchangeable as well as temperature compensated. The PPS-1 is provided as a full bridge circuit for use with existing instrumentation for making pressure measurements.

APPLICATIONS:
The PPS-1 is designed for invasive use in measuring pressure at selected anatomical sites and more specifically for use in thermal dilution catheters and wedge pressure catheters. It may also be used for non-invasive applications.

The unique features of the THM physiological pressure sensor model PPS-1 are:

- small size
- high sensitivity
- high accuracy
- high stability
- low cost

THM solicits customer inquiries for special applications.

Typical dynamic pressure signals

THERMOMETRICS
product data

808 U.S. HIGHWAY #1•EDISON, NEW JERSEY 08817-4695•(201) 287-2870•TELEX 844-387

PHYSIOLOGICAL PRESSURE
SENSOR BULLETIN PPS-1

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free product data available upon request

THERMISTOR TEMPERATURE STANDARDS FOR LABORATORY USE

M. SAPOFF AND H. BROITMAN
Thermometrics, Inc.

Until recently there has been no low-cost temperature standard available for routine laboratory measurement with accuracies of 0.01°C or better in the temperature range of 0°C-100°C. Temperatures in this range are defined in terms of standard platinum resistance thermometers (SPRT) calibrated at a number of fixed points. These thermometers, when used with expensive instrumentation, can provide accuracies of 0.001°C. However, they must be used with care, and are not suitable for normal laboratory use. They are not suitable for field environments in which shock and vibration exist.

Recent advances in the state-of-the-art of thermistor processing have yielded high-stability, reproducible thermistors that qualify as temperature standards. Thermistor beads sealed into glass probes offer excellent resistance to mechanical shock, vibration, and thermal shock, which further influences their selection as practical temperature standards.

Thermistor temperature standards require no special instrumentation. They are rugged and offer short-term stability comparable to that of standard platinum resistance thermometers. They are more suitable than platinum standards for use as transfer standards, and may replace platinum units for measurements between the ice-point and steam-point.

DEFINING STANDARDS IN USE

Most scientific temperature measurements are based on the International Practical Temperature Scale of 1968 (IPTS-68). Temperature on the IPTS-68 may be expressed either in Kelvins (T_{68} or K) or in degrees Celsius (t_{68} or °C). The relationship between the International Practical Kelvin Scale and the International Practical Celsius Scale is given by:

$$t\,^\circ C = T - 273.15K \qquad (1)$$

"The IPTS-68 is based on the assigned values of the temperature of a number of reproducible equilibrium states (defining fixed points) and on standard instruments calibrated at those temperatures".[1] These defining fixed points are shown in Table 1.

Above 1064.43°C, the IPTS-68 is defined by the Planck law of radiation.

Between 630.74°C and 1064.43°C, the scale is defined by the equation:

$$E(t) = a + bt + ct^2 \qquad (2)$$

where E(t) is the electromotive force of a standard platinum-10% rhodium/platinum thermocouple with the reference junction at 0°C, and the measuring junction at the unknown temperature, t. The constants a, b, and c, are determined from measurements at 630.74°C ±0.2°C (as determined by a standard platinum resistance thermometer), and at the freezing points of silver (961.93°C) and gold (1064.43°C).

FIGURE 1. Series S-10 Thermistor Temperature Standard.

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THERMISTOR TEMPERATURE
STANDARDS FOR
LABORATORY USE
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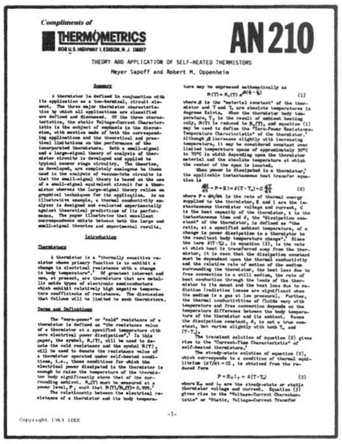

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AN 210

THEORY AND APPLICATION OF SELF-HEATED THERMISTORS

Meyer Sapoff and Robert M. Oppenheim

Summary

A thermistor is defined in conjunction with its application as a two-terminal, circuit element. The three major thermistor characteristics by which all applications are classified are defined and discussed. Of the three characteristics, the static Voltage-Current Characteristic is the subject of emphasis in the discussion, with mention made of both the corresponding applications and the theoretical and practical limitations on the performance of the incorporated thermistors. Both a small-signal and a large-signal theory of analysis of thermistor circuits is developed and applied to typical sensor stage circuitry. The theories, as developed, are completely analogous to those used in the analysis of vacuum-tube circuits in that the small-signal theory is based on the use of a small-signal equivalent circuit for a thermistor whereas the large-signal theory relies on graphical techniques for its application. As an illustrative example, a thermal conductivity analyzer is designed and evaluated experimentally against theoretical predictions of its performance. The paper illustrates that excellent correspondence exists between both the large and small-signal theories and experimental results.

Introduction

Thermistors

A thermistor is a "thermally sensitive resistor whose primary function is to exhibit a change in electrical resistance with a change in body temperature".[1] Of greatest interest and use, at present, are thermistors that are metallic oxide types of electronic semiconductors which exhibit relatively high negative temperature coefficients of resistance. The discussion that follows will be limited to such thermistors.

Terms and Definitions

The "zero-power" or "cold" resistance of a thermistor is defined as "the resistance value of a thermistor at a specified temperature with zero electrical power dissipation".[1] In this paper, the symbol, $R_o(T)$, will be used to denote the cold resistance and the symbol $R(T)$, will be used to denote the resistance value of a thermistor operated under self-heated conditions, i.e., those conditions for which the electrical power dissipated in the thermistor is enough to raise the temperature of the thermistor body significantly above that of the surrounding ambient. $R_o(T)$ must be measured at a power level, P, such that $R(T)/R_o(T) = 0.999$.[1]

The relationship between the electrical resistance of a thermistor and its body temperature may be expressed mathematically as

$$R(T) = R_o(T_o)\, e^{\beta\left(\frac{1}{T} - \frac{1}{T_o}\right)} \qquad (1)$$

where β is the "material constant" of the thermistor and T and T_o are absolute temperatures in degrees Kelvin. When the thermistor body temperature, T, is the result of ambient heating only, R(T) is reduced to $R_o(T)$, and equation (1) may be used to define the "Zero-Power Resistance-Temperature Characteristic" of the thermistor.[1] Although β increases slightly with increasing temperature, it may be considered constant over limited temperature spans of approximately 30°C to 70°C in width depending upon the thermistor material and the absolute temperature at which the center of the span is located.

When power is dissipated in a thermistor,[1] the applicable instantaneous heat transfer equation is

$$\frac{dH}{dt} = P = EI = \delta(T - T_a) + C\frac{dT}{dt} \qquad (2)$$

where $P = dH/dt$ is the rate of thermal energy supplied to the thermistor, E and I are the instantaneous thermistor voltage and current, C is the heat capacity of the thermistor, t is the instantaneous time and δ, the "dissipation constant" of the thermistor, is defined as "the ratio, at a specified ambient temperature, of a change in power dissipation in a thermistor to the resultant body temperature change".[1] Since the term $\delta(T - T_a)$, in equation (2), is the rate at which heat is transferred away from the thermistor, it is seen that the dissipation constant must be dependent upon the thermal conductivity and the relative rate of motion of the medium surrounding the thermistor, the heat loss due to free convection in a still medium, the rate of heat conduction through the leads of the thermistor to its mount and the heat loss due to radiation (radiation losses are significant when the medium is a gas at low pressure). Further, the thermal conductivities of fluids vary with temperature and free convection depends on the temperature difference between the body temperature of the thermistor and its ambient. Hence the dissipation constant, δ, is not a true constant, but varies slightly with both T_a and $(T - T_a)$.

The transient solution of equation (2) gives rise to the "Current-Time Characteristic" of self-heated thermistors.[1]

The steady-state solution of equation (2), which corresponds to a condition of thermal equilibrium ($dT/dt = 0$), is obtained from the reduced form

$$P = E_T I_T = \delta(T - T_a) \qquad (3)$$

where E_T and I_T are the steady-state or static thermistor voltage and current. Equation (3) gives rise to the "Voltage-Current Characteristic" or "Static, Voltage-Current Transfer

-1-

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THEORY AND APPLICATION
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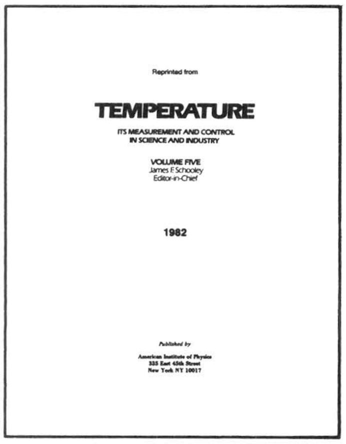

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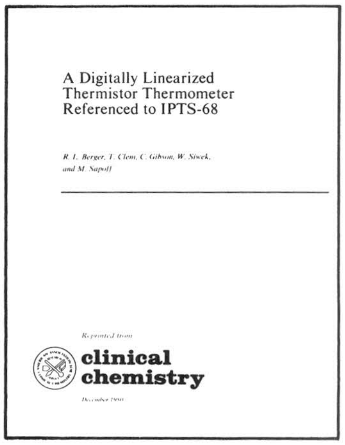

A Digitally Linearized
Thermistor Thermometer
Referenced to IPTS-68

R. L. Berger, T. Clem, C. Gibson, W. Siwek,
and M. Sapoff

Reprinted from

clinical chemistry

December 1980

A DIGITALLY LINEARIZED
THERMISTOR THERMOMETER
REFERENCED TO 1PTS-68
(Reprinted from Clinical Chemistry)

THERMOMETRICS INC.
808 U.S. HIGHWAY 1, EDISON, N.J. 08817
PHONE: (201) 287-2870

GENERAL INFORMATION

PRICING: Since there are many possibilities of resistance, tolerance size, etc., and since prices are subject to change, it is not practical to furnish a detailed price list with the catalog. Please contact the factory for price and delivery information.

DELIVERY: All items are shipped via UPS, F.O.B. Edison, New Jersey, unless other arrangements have been specified by the purchase order.

TERMS: Our terms are strictly net 30 days for established credit accounts. New customers may submit 3 vendor references and 1 bank reference in order to establish a credit account. To expedite delivery, a new customer may elect to pay in advance or to receive a C.O.D. shipment.

ORDERING: Each thermistor series has an ordering information paragraph to explain the part number ordering code for catalog items only. When special handling, testing, assembly or other non-standard options are involved, please contact the factory for specific price, delivery and ordering information.

All orders require a written confirmation. Please be sure to specify purchase order number, shipping and billing addresses, name and telephone number of buyer and reference any quotations or documents. Include copies of drawing or specifications which are referenced on your purchase order.

REQUESTED INFORMATION: Thermometrics, Inc., welcomes all requests for price and delivery quotation and requests for applications assistance. Whether for a one time experiment or for a large volume O.E.M. requirement you will find that we are proud of our reputation and of our ability to assist customers as "The Source of Thermistor Expertise."

When requesting information or assistance please try to specify as much of the following data as possible so that we may be better able to serve you quickly and completely.

THERMISTOR:

- configuration, style, special options, etc.
- dimensions; length, diameter, etc.
- nominal resistance and tolerance at reference temperature. (additional points)
- curve tracking, interchangeability, range.
- operating/storage temperature range.
- thermal and electrical properties; dissipation constant, thermal time constant, max. power.

ASSEMBLY:

- mount or housing configuration
- materials; metals, plastics, insulating, etc.
- dimensions; length, diameter, threads, etc.
- extension leads; size, length, insulation, etc.
- termination; stripped ends, connectors, etc.
- operating/storage temperature range.

APPLICATIONS:

- temperature measurement, temperature control, temperature compensation, flow sensing, liquid level sensing, gas analysis, infrared measurement or microwave power measurement.
- environment; solid, liquid or gas useage; industrial, biomedical, military, research lab, etc.
- linerarized networks, bridge circuits, etc.
- power sources, requirements.
- quality assurance; certificates of compliance, applicable mil-specs or standards, screening tests, inspection, etc.
- calibrations, equation constants, etc.

THERMOMETRICS INC.

RESISTANCE - TEMPERATURE CHARACTERISTICS